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A STUDY OF SOME [illegible]

ORGANIZATIONAL [illegible] THE ROLE OF THE [illegible]

COORDINATOR [illegible] SCHOOLS

BY

© [illegible]

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE

DEGREE OF MASTER OF [illegible]

DEPARTMENT OF [illegible] EDUCATION

EDMONTON, ALBERTA

FALL, [illegible]

THE UNIVERSITY OF ALBERTA

A STUDY OF SOME RELATIONSHIPS BETWEEN INNOVATIVENESS, ORGANIZATIONAL CLIMATE AND THE ROLE OF THE SCIENCE COORDINATOR IN JUNIOR HIGH SCHOOLS

BY

© ROBERT PETER HERON

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled "A Study of Some Relationships Between Innovativeness, Organizational Climate and the Role of the Science Coordinator in Junior High Schools" submitted by Robert Peter Heron in partial fulfilment of the requirements for the degree of Master of Education.

ABSTRACT

Concern has been expressed by students of organizations that a "holistic" or systems approach could be profitably used in studying human organizations. This approach emphasizes the importance of both role relationships and the forces which influence such relationships. It also implies that role relationship, roles of individuals and influences upon roles and role relationships be clearly defined.

This study's purpose was to determine the existence and nature of relationships between innovativeness in junior high school science programs, the organizational climate of junior high schools and the role of the junior high school science coordinator.

Five problems were examined by testing hypotheses through data collected from forty-three principals, one hundred and eighty-seven science teachers and ten science coordinators in forty-four schools in the Edmonton Public School District, Alberta. Ten hypotheses considered innovativeness as the dependent variable and climate and coordinator variables as the independent variables. Two hypotheses considered climate as the dependent variable and coordinator variables as the independent variable. One hypothesis examined relationships between various coordinator

leadership characteristics. Two indices, the number of innovations in a school and the extent of innovativeness, were devised to measure innovativeness. Climate was measured by the Organizational Climate Description Questionnaire and leadership by the Leadership Behavior Description Questionnaire - Form XII.

It was concluded that innovativeness in terms of new courses being utilized in junior high school science was most common in those schools: (a) having a more open climate, (b) in which a science coordinator was teaching science, and (c) in which there were warm, cooperative relationships between science teachers and the principal and among science teachers. Innovativeness was generally unrelated to any leadership characteristics of the coordinator investigated. Moreover, innovativeness appeared to be mainly a function of the efforts of individual science teachers except in those schools having a resident coordinator.

Finally, it was clearly revealed that the coordinator was functioning effectively only in the school in which he was based. His lack of effectiveness in all other schools seems to be attributable to: (a) his own lack of a clear perception of his role and the science teachers lack of clear role expectations of his role, (b) the resulting incongruency between role perceptions and role expectations, and (c) insufficient time having been allowed for his duties as a coordinator.

defining the indices and to Mr. D. Flathman for his guidance during the data analysis.

To the Department of Secondary Education thanks are expressed for the financial assistance which permitted the writer to undertake a master's program at the University of Alberta and to the Edmonton Public School Board for partially financing this study.

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CHAPTER I

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I. INTRODUCTION

This study is broadly concerned with formal organizations and the effect of collective and cooperative actions of the members on the achievement of organizational goals. Specifically the study is concerned with examining such actions in terms of relationships between the members and the effect these relationships have on the adoption of innovations for trial purposes.

Traditionally, organizations have been described and studied from two basic viewpoints. Gouldner (1959) has observed that the Comtian viewpoint has emphasized the non-rational characteristics of organizations while a Weberian viewpoint has emphasized the formal or more rational features. Both positions, according to Gouldner, agree that human organizations are basically goal-directed and have profound societal effects. They disagree as to the effects organizations have upon the individuals which form them. The Comtian viewpoint sees an organization as a liberating force for the individual through the greater efficiency and productivity associated with organizations. The Weberian viewpoint sees organizations as being destructive of individual personality through a dehumanizing regimentation.

During the latter part of the nineteenth century and the early part of the twentieth century the Weberian concepts dominated both studies of organizations and the organizations themselves. The bureaucratic and legal-rational characteristics of organizations were emphasized. However, in the nineteen twenties, Mary Parker Follett called attention to the place of the individual within the formal organization, to the relationships between individuals, and to the motives and perceptions determining these relationships. Today her concerns have assumed greater significance as a result of the contributions of sociologists and social psychologists, with the consequent realization that organizations fulfill both bureaucratic and personal needs.

This study focuses upon the role relationships between the individuals who form formal organizations, namely, the science teachers, the principals and the science coordinators in the junior high schools of one school system. The effect that these relationships have had upon the adoption of innovations in science curricula is also examined.

II. THE PROBLEM

The central question of this study is: "Are there relationships between school organizational climates, the adoption of selected innovations and the role of the science coordinator in the junior high schools of a large urban

school system?" (The terms "climate", "innovations" and others are defined on pages 12 and 13). This question will be examined firstly, in terms of theoretical models and constructs and secondly, in terms of empirical results.

Theoretical Aspects

To restate this question for theoretical analysis three components, namely climate, innovations and roles, will be isolated and then synthesized. This will be done by considering an organization as an open system functioning in an environment or supra-system and as being composed of interrelated sub-systems (Katz and Kahn, 1967). In these terms certain theoretical relationships which explain climate as resulting from the interaction of various roles, which correlate climate and the introduction of innovations, and which describe a coordinator as an agent of change can be established. General systems theory, as developed by Bertalanffy (1956) and as applied to organizations by Miles (1964), has identified the essential components of organizations by considering them as open systems. The Katz and Kahn (1967) model of a role episode based upon Allport's (1962) Theory of Cycles of Events has identified, in behavioral terms, the relationships between individuals performing certain roles. Rogers' (1962) model of the Adoption Process has identified the stages through which an innovation passes to its eventual adoption or rejection.

All of these theoretical considerations form the substance of Chapter II of this study.

Operational Aspects

To restate the main question for analyzing empirically-determined data the following subproblems have been isolated:

(1) Is there a relationship between innovativeness and organizational climate?

(2) Is there a relationship between innovativeness and the presence of a resident coordinator?

(3) Is there a relationship between innovativeness and certain leadership characteristics of a coordinator?

(4) Is there a relationship between organizational climate and the presence of a resident coordinator?

(5) Is there a relationship between certain role characteristics of a coordinator as they concern innovativeness?

Significance of the Problem

Numerous writers have suggested that the five types of relationships noted above might exist. Miles (1964), stated that "the progress of any innovation must be examined in relationship to a complex network of groups, individuals and organizations." Wiens (1967) later observed

that "It seems appropriate soon to attempt a research project which will indicate whether highly bureaucratic are more or less innovative than non-bureaucratic schools." He continued, "In general this [his own] study provides evidence that innovativeness in a system is related to the state of the system as well as to factors outside the system." A similar theme was developed by Andrews (1965) who, writing in the context of the school organizational climate, said that there is "a strong influence of the systems theory model upon current approaches to the study of organizations." He further stated that:

> For this reason [the change in strategy towards the development of organization theory], the work of Halpin and Crofts in identifying and constructing a measure of the concept 'organizational climate' is potentially of considerable significance.

Katz and Kahn (1967) have also observed that:

> Research [in terms of organizations as open systems] has neglected organizational climate, yet it can provide rich returns for the understanding of organizational functioning.

Such comments have certain practical implications. Miklos (1965), noting certain differences between schools with regard to instructional programs, stated that:

> Such observations might be summed up by stating that the climates of some schools are conducive to the improvement of instructional programs while those of others are antagonistic to such activities.

The present study assumed that the innovations selected, namely recently developed science programs and textbooks,

could be considered as an "improvement of instructional programs" as referred to by Miklos (1965). It is realized that there is a value judgement implied in using the term "improvement". However, this does not prohibit using such programs and textbooks as examples of innovations.

The junior high school science coordinator, appears to function in at least two major roles:

> As a member of the teaching staff in a school he contributes to the climate of that school.
>
> In the schools in which he functions as a coordinator he is partially responsible for introducing and coordinating changes in science programs and in methods of teaching science (*cf. post*).

In terms of innovations there seems to be some confusion about the nature of an agent of change in an educational organization generally and the function of the science coordinator specifically. Chapter III will develop the suggestion that he operates as a science teacher responsible for encouraging and stimulating changes in the science curriculum.

Thus this study attempts to develop significant theoretical and practical conclusions concerning the influence of both climate and the role of the science coordinator upon the innovativeness of junior high schools. If relationships are established between organizational

climate and innovations, teachers and administrators might be able to identify, in advance, those conditions most favorable to the trial and evaluation phases of experimental programs. If a relationship can be shown to exist between the activities of the coordinator and his effectiveness as a leader in stimulating innovativeness, teachers and administrators might have a clearer perception of his role and thus utilize his services more effectively. Finally, it is hoped that this study will add further insights into the relevance general systems theory has for organization theory, the concept of organizational climate and the utility of the model which describes organizations in terms of a network of role relationships.

III. DELIMITATIONS AND LIMITATIONS

Delimitations of the Study

This study was restricted to an examination of the total population of junior high school principals, science teachers and science coordinators in the Edmonton Public School system. Forty-three principals, ten coordinators and one hundred and seventy-four teachers were involved. This population, as stated, may be regarded in the narrow sense as all of junior high school science personnel. However, it seems also appropriate to consider this population as a sample of some larger, hypothetical population of junior high schools, science teachers and coordinators.

Limitations of the Study

The study is limited to theoretical and descriptive evidence concerning role relationships and encompasses only a narrow area of change. Since an ex post facto approach has been adopted, the time factor and the various adoption stages have not been included in the design.

Furthermore, specific characteristics, such as size and location of the schools and age, sex, and training of the respondents are not examined except where their significance has been established by previous research in the areas of climate and innovation. It is the view of Bertalanffy (1967b) and Katz and Kahn (1967) that previous emphasis upon the description of individual components in order to describe "the whole" has been based upon mechanistic models in which cause and effect were viewed exclusively as a relationship between two variables. Katz and Kahn (1966) have expressed this most forcefully:

> So long as writers are committed to a theoretical framework based upon the physical model they will miss the essential social-psychological facts of the highly variable, loosely articulated character of social systems.

Arthur Koestler (1964) speaking in terms of the individual, has expressed this even more succinctly saying that "for the anthropomorphic view of the rat, American psychology has traded in a ratomorphic view of man." Numerous authors, (Bertalanffy, 1969; Bennis, 1966; Katz and Kahn, 1967; and Miles, 1964, 1965) have stated that a

social system or, for that matter, any system of living components is best described in terms of functioning relationships between such components. In fact, the implications are strong that the components can only be described meaningfully in terms of such relationships.

Further limitations arise from some basic conditions and assumptions:

(1) The study is exploratory in the areas of organizational climate, role theory, general systems theory and innovations in general, and in the examination of junior high school science programs and the role of the junior high school science coordinator in particular.

(2) Any innovation had the approval of both the central office and the school principal.

(3) The continuation of any science curriculum innovation introduced since 1966 was equivalent to being a new innovation.

(4) If an innovation had been adopted by at least one teacher in the school all science teachers would have an equal awareness of it.

(5) The role of the science coordinator lacks authority derived through coercive and traditional power as described by Bennis (1966).

(6) The coordinator has been selected by central office authority to bring about change.

(7) The data collected by the instruments accurately represent the existing conditions in each school.

IV. DEFINITION OF TERMS

Definitions of general terms used in this report are described in this section. Other terms which are more specific will be defined as they arise.

Systems

A system is "a complex of components in interaction" (Bertalanffy, 1967b).

General systems theory is "a discipline concerned with the general properties and laws of 'systems'" (Bertalanffy, 1967b).

An open system is "a system maintained in import and export, building-up and breaking-down of material components in contrast to closed systems of conventional physics without exchange of matter with environment" (Bertalanffy, 1967a).

A boundary is "the line forming a closed circle around selected variables, where there is less exchange of energy (of communication, etc.) across the line of the circle than within the delimiting circle" (Chin, 1961). It distinguishes a system from its supra-system or environment.

A social system is "a structuring of events or

happenings rather than of physical parts and it therefore has no structure apart from its functioning" (Katz and Kahn, 1967).

The School System

An organization, a school organization or a school refers to elementary-junior and junior high schools as formal, service organizations.

Junior high schools are schools incorporating grades seven, eight and nine.

Elementary-junior high schools or combined schools are those schools incorporating one or more of grades seven, eight and nine and other grades.

A formal organization is a set of role relationships which is officially recognized.

A service organization is an organization which benefits that section of the public with which it has contact (Blau and Scott, 1962).

A science teacher is a teacher who is teaching at least one science course in a junior or elementary-junior high school.

A science coordinator or coordinator is a science teacher in one school who has been officially designated science coordinator for that school and for several others in which he is not a resident teacher.

Climate

Organizational climate is operationally defined by the Organization Climate Description Questionnaire and is substantively defined as the "personality" (Halpin and Crofts, 1963) of an organization. This "personality" is produced by "the patterns of social interaction that characterize organizations. The main units of interaction in the concept of climate are individuals, the group as a group, and the leader" (Feldvebel, 1964).

Role episodes formed from such interactions are composed of the expectations and the sent role of role senders and the received role and role behavior of the focal person (Katz and Kahn, 1967).

Innovation Leadership

Numerous functional titles have been assigned to roles associated with the implementation of change. Of these only the following, with specific connotations, will be used in this study.

A *change* agent is a professional role, usually from outside the organization, which has the power and the ability to effect specific changes (Bennis, 1966).

An *opinion-leader* is not a formal role but rather a postulated characteristic of a leader in innovativeness and is defined by Rogers (1968) as one who is a source of information for his followers, who forms communication links with sources of innovation both from within and from outside

the system, who has a high degree of accessibility, and who has more experience, a larger income, and is more innovative than his followers.

Innovations

An innovation is a science curriculum program and/or textbook (eg. Exploring Science) which has been introduced into the system between January 1966 and January 1968.

Pilot projects are the eleven science curriculum programs and/or textbooks described separately in Chapter IV.

Innovativeness is a characteristic of both a school and a science coordinator. In describing the school, it is determined by the number of pilot projects and the extent to which science teachers are using them. In describing the coordinator, it is determined by the average number of pilot projects and the average extent of their use in the schools for which he is a coordinator. The derivation of these two indices of innovativeness is described in Chapter IV.

CHAPTER II

THEORETICAL CONTEXT

> Change in schools must be seen as a process involving individuals as interacting subsystems of primary groups which in turn are subsystems of progressively larger and larger groups (Andrews and Greenfield, 1967).

It has seemed realistic to acknowledge that systems composed of living units are open systems and that general systems theory, provides many concepts which, if developed, permit an examination of such systems. Regardless of their conceptual base, studies of organized human behavior raise a multitude of questions and provide only provisional answers. At the best, empirical observations which seek to describe climate, role relationships and the phenomena of change are but gropings towards an understanding of human systems.

Chin (1961) makes the useful distinction between analytic theoretical models and concrete theoretical models. The former is a simplified construction of a section of reality which permits a description of the relationships of certain elements wherever they occur. The latter is based on the analytic model but uses the content of actual cases. To develop the background referred to previously, the analytic model of general systems theory and role episodes will form the basis of the concrete models of climate and the process of adoption of innovations.

II. SYSTEMS THEORY AND LIVING SYSTEMS

It would appear that during the last century at least, increasingly more concern has been developing over the inability of mechanical models, such as Newtonian causality and Skinnerian stimulus-response patterns, to describe accurately the organized complexity of much of natural phenomena. Such complexities are noted by the organismic conceptions of biology, sociology's concept of the supra-individual organization, the man-machine technology of the applied sciences, and the concept of multivariable interactions in physics and chemistry. The development of inferential statistics has done much to highlight the realities of phenomena which can be explained only in terms of relationships between variables (Weaver, 1948). A systems approach is concerned primarily with describing, in discrete, meaningful terms, variables within a given set of relationships and with describing a system as something more than the sum of its parts. General systems theory is a manifestation of a systems approach. It is "a discipline concerned with the general properties and laws of systems" (Bertalanffy, 1967b), and with providing a common set of concepts and language in order that scientists in a variety of fields can communicate more effectively. It was developed mainly from concepts arising from studies of open systems and derives its rationale from empirically-determined observations and conclusions (Bertalanffy, 1956).

Open and Closed Systems

Bertalanffy (1967b) has made a careful distinction between open and closed systems. He observed that closed systems have little or no exchange of matter with their environment. In terms of energy, closed systems eventually reach a state of equilibrium with an external environment and a state of randomness in their internal environment, namely, a state of entropy. Conversely, open systems are continuously exchanging both matter and energy with their environment. In terms of energy, they maintain a homeostatic state with their external environment through a balance between input and output processes, and in their internal environment through a balance between anabolic and catabolic processes. By this method of counteracting entropic processes, an open system moves towards growth and elaboration of parts. Open systems are also characterized by the attribute of equifinality, namely that some end point or goals (i.e. successful adaptation, stability, production of goods and/or services and so on) can be achieved from several different initial conditions. This is not a characteristic of closed systems.

As well as these characteristics of dynamic homeostasis and equifinality, Katz and Kahn (1967) have also applied the following features of open systems to studies of organizations:

(1) Inputs -- are materials and energy from the

external environment which are essential to the maintenance and functioning of the system. They may be materials, personnel, services, innovations and so forth. Awareness by the system of potential inputs implies that the system is sensitive to its external environment.

(2) Through-put -- is the reorganization of inputs by means of a system's ability to do organized work towards specific goals.

(3) Out-puts -- are the goals in terms of products, and/or services, or they may be just the maintenance of stability.

(4) Structural arrangement -- describes both morphological relationships and the interactions between subsystems.

(5) Negative entropy -- is a condition of an open system which arises when more energy is imported from the environment and stored than is used and/or released. Open systems must use energy in order to maintain this condition.

(6) Differentiation -- is the continuous specification of parts and elaboration of functions in the system in response to changing environmental conditions. Without this sensitivity, progressive mechanization (Bertalanffy, 1956) sets in and organizational health deteriorates

(Miles, 1965).

It would be unwarranted to consider a human organization as a super-organism even though the above features are applicable, in generalized conceptions, to the functioning of both the individual organism and an organized collectivity of organisms. Unlike purely biological systems (for example a cell or non-human organisms), human organizations can be devised and revised for varying objectives or goals, and show unpredictable growth curves. Like non-human organisms, organizations expend much energy in maintaining the system through the use of control mechanisms.

Subsystems, Supra-systems and Boundaries

The usefulness of a systems approach resides firmly in the manner by which the system is defined. There must be a clear, specific statement of what elements are internal and external to it. A junior high school can be considered to be a separate system located within two, larger, supra-systems, namely the whole urban school system and the socio-economic environment surrounding the school. Each school is composed of sub-systems which can be considered as the set of the interrelationships between a science teacher, all other science teachers in that school, and the principal. The role of coordinator may or may not be part of these interrelationships.

The boundary of each school can be defined not only spatially but also functionally (*cf. ante*) by such variables as the sum of the measured perceptions of role relationships, the influence of the science coordinator and the presence of innovations.

Steady State

One position in organizational theory has emphasized that organizations have a predisposition towards stability rather than towards change. This stability is maintained through homeostatic mechanisms which break down and are replaced by new mechanisms only under crisis conditions. Argyris (1958) and Andrews and Greenfield (1967) have reviewed and adopted this position. However, it is a position which Miles (1965) has found to be incompatible with his concept of "organizational health", namely, that a healthy organization is in a constant state of change through adapting to constantly changing environmental conditions. Griffiths (1964) has suggested that the degree and duration of an organization's adaptive reponses to environmental change is directly proportional to the intensity of the stimuli it receives from its environment.

It is suggested that Argyris' position arises because the concept of homeostasis, whether dynamic or not, is essentially mechanistic, based as it is on cause-effect feedback mechanisms. It is operative at certain levels of open systems (Boulding, 1956), but covers "animal behavior

only partly and an essential part of human behavior not at all" (Bertalanffy, 1967). Bertalanffy continues:

> In general, the homeostasis scheme is not applicable (a) to dynamic regulations, i.e. regulations not based upon fixed mechanisms but within a system functioning as a whole (e.g. regulative processes after brain lesions); (b) to spontaneous activities; (c) to processes whose goal is not reduction but the building up of tensions; (d) to processes of growth, development creation, and the like. We may also say that homeostasis is inappropriate as an explanatory principle for those human activities which are non-utilitarian, not serving the primary needs of self-preservation and survival and their derivatives -- as is indeed the case with many "cultural" manifestations. This is so because they are symbolic rather than biological values.

It can therefore be argued that human organizations, which function at the levels of communications and perceptions and expectations of message sets, are not explainable in terms of dynamic homeostasis. This does not deny that feedback occurs to modulate responses but suggests rather that only the way feedback is perceived is significant.

III. ORGANIZATIONAL CLIMATE AND ROLE THEORY

As previously mentioned (_cf._ _ante_), general systems theory has provided some useful concepts for describing the set of relationships in open systems. One attempt to describe and, to some extent, to measure the set of role relationships in organizations is through the concept of organizational climate. This concept has arisen from two concerns.

The first, a substantive concern, was with a more precise identification of what was meant by the "feel" or "atmosphere" of an organization. Climate has since been described by Halpin and Croft (1963b) and Miklos (1964) as the "personality" of the organization. However, the concept of climate was previously used by Argyris (1958) to describe the pattern of relationships existing between the variables associated with the formal organization, the informal organization and the personality of the individuals involved. From this he reasoned that climate is a homeostatic condition of an organization. It was, in part, this emphasis on the <u>relative</u> stability of organizations that led Halpin and Croft (1963b) to equate climate with personality. Using this concept Miklos (1965) has interpreted climate as the: "characteristics of certain social relationships which exist among members of an organization and between the total organization and its participants." Feldvebel (1964) has expressed this even more relevantly when he viewed climate as:

> ... the patterns of social interaction that characterize an organization. The main units of interaction in the concept of climate are individuals, the group as a group and the leader.

Superficially there appears to be a contradiction between the assumed stability of organizational climate and the constantly changing nature of healthy organizations. It is outside the scope of this study to examine this paradox

though it is suggested that internal homeostatic mechanisms are not, perhaps, the essential mechanisms for defining stability.

The second area of concern, that of syntax, has been the problem of identifying and quantifying significant climate dimensions. Hemphill (1956) pioneered the way by identifying thirteen dimensions which describe a group. A more recent and widespread method, though not necessarily a definitive one, is the Organizational Climate Description Questionnaire (OCDQ) developed by Halpin and Croft.

Halpin and Croft (1963a) identified, from eight subtests, three groups of global factors describing and underlying the concept of climate.

The first group is composed of six global profiles or types of climate based upon prototypic relationships between subtests. These types form a continuum from <u>open</u> through <u>autonomous</u>, <u>controlled</u>, <u>familiar</u>, and <u>paternal</u> to <u>closed</u>.

The second group of factors was derived by analyzing the subtest scores through factor analytic techniques. The results suggested that there were three aspects to climate. The first, <u>social needs</u>, seemed to describe the degree to which individual social needs were satisfied. The second, <u>esprit</u>, suggested the degree to which the group's need for task achievement and group maintenance were being met. The third, <u>social control</u>, described leader behaviour.

. The third group of global factors was derived by factor-analyzing the six global profiles. Again the individual, the group and the leader appeared. This time the individual dimension was blended with the other two to produce authenticity, a description of the openness of the leader's and group members' behaviour. The esprit factor became satisfaction, the group members' attainment of mutual satisfaction in respect to task accomplishment and fulfillment of social needs. The social control factor became associated through leadership acts with leadership initiation, the latitude within which the group members as well as the leader can initiate leadership acts.

The extremely tenuous quality of these factors for providing a basis for operational definitions has been commented upon by both Halpin and Croft (1963a) and Andrews (1965). The former noted "how utterly refractory this concept [Authenticity] is to specification by 'operational definition'." The latter concluded that the overall climate categorizations were little more than descriptions of commonly occurring patterns of principal-staff interactions and that they tend to predict nothing that is not better predicted by the subtests. Miklos (1964), however, felt that the OCDQ, and the analysis based upon it, was the best method available for examining organizational climate and that improvements in conceptualizations of school climate could be accomplished best by building upon this base.

More recently Katz and Kahn (1967) have suggested that "research [in viewing organizations as open systems] has neglected organizational climate, yet it can provide rich returns for the understanding of organizational functioning."

Role Theory

Implicit (or stated) in the foregoing discussion are the assumptions that: (a) a more significant understanding of organizations can be obtained through examining the relationships between the units of a system rather than by describing the discrete characteristics of the units themselves, and (b) the social relationships between the individuals in a formal organization are characterized by organizational climate. Allport (1962) has conceived of these relationships as interrelated sets of cycles of events. He suggests that it is events, the activities which form the relationships between role encumbents, which are structured rather than the roles themselves. It is events which give a social structure its dynamic rather than static characteristic. A single cycle of events produces a simple form of this structure. It is a set of activities which arise from the role demands and perceptions of person A to elicit behavior from and become modified by some behavior of person B. Such a simple cycle, Allport suggests, combines with other cycles to form a system of events. In a system various cycles can be overlapping, tangential to each other

or contained within each other.

Katz and Kahn (1967), adopting Allport's conceptualizations, have conceived of organizations as systems of roles and, more crucial, of the activities arising from role behaviors. The simplest system of role activities is described by a *role episode*.

Figure 1

A MODEL OF THE ROLE EPISODE
(after Katz and Kahn)[1]

Role Senders		Focal Person	
Expectations	Sent Roles	Received Role	Role Behavior
Perceptions of focal person's behavior: Evaluation	Information: Attempts at influence.	Perception of role, and perception of role sending.	Compliance: Resistance: "side effects"
I	II	III	IV

1

2

Role expectations are the evaluative standards applied to anyone holding an organizational office or position. The *sent role* is directed towards the focal person and consists of message sets, patterns of communications and influencing

---

[1]from Katz, D. and R. L. Kahn, *The Social Psychology of Organizations*. New York: John Wiley & Sons, Inc., 1967, pp. 182-186.

actions arising from the role expectations and directed towards the focal person. The received role is the focal person's perception of what is sent to him and what he "sends" to himself. Role behavior is the focal person's response to what he has received.

In this model there is a symmetry. Boxes I and III represent processes of perception, cognition and motivation -- processes which are internal to the individual. Boxes II and IV represent behaviors which express these processes. The term focal person is used mainly as a reference point from which observations can be made. Arrow 1 represents the process of role sending while arrow 2 represents the process by which the role sender evaluates the behavior of the focal person and prepares to initiate new action. Thus arrow 2 represents a feedback loop. While this model superficially resembles a typical homeostasis model, it must be restated that the multitude of confounding variables present in all six areas of this model precludes a simple mechanistic interpretation (cf. ante).

It is therefore suggested that the social relationships between teacher, teachers as a group and the leader, in terms of the dimensions of organizational climate (cf. ante) and quantified by the subtests of the OCDQ, can also be described by the above model of role episodes. In addition, this model seems to provide additional justification for describing organizational climate in terms of general

systems theory.

IV. INNOVATIONS AND INNOVATORS

It has already been suggested (cf. ante) that open systems, if healthy, are continually sensitive to their external environment and thus to changes in and pressures from this environment. Human organizations have been defined in terms of role relationships or organizational climate. It is argued that there is a direct relationship between the state of the climate in terms of its openness to, sensitivity to, or receptivity to the environment and the kinds of change which occur in, or are introduced into, the system. One result of such sensitivity is innovation.

Several students of innovations and organizational change have noted that the tradition of innovation research and theorizing has concentrated upon the characteristics of the individual adopter and the innovation adopted. Willower (1963) commented that:

> It seems clear that the educational administrator who wishes to provide for productive change and innovation needs to promote what Halpin and Croft, adopting Rokeach's notion of the open and closed mind to organizations, have called the organizational climate.

In the same vein E. Katz (1963) suggested that studies are needed which compare different kinds of situations within a system with innovativeness since most studies classify

individuals (not positions and groups) in terms of acceptance of innovations. More recently Ingram (1966) has suggested that climate is a predictor of innovativeness in educational systems. And most recently, Carlson (1969, pers. comm.) has emphasized that an organization's response to change through the adoption of innovations is essentially a learning process in which individuals, working within and influenced by a set of social relationships, are the key elements. As Miles (1964) has noted, "the progress of any innovation must be examined in relationship to a complex network or groups, individuals and organizations." He further observed (1964) that "nearly any innovation attempt will be conditioned by forces at work within and between subsystems."

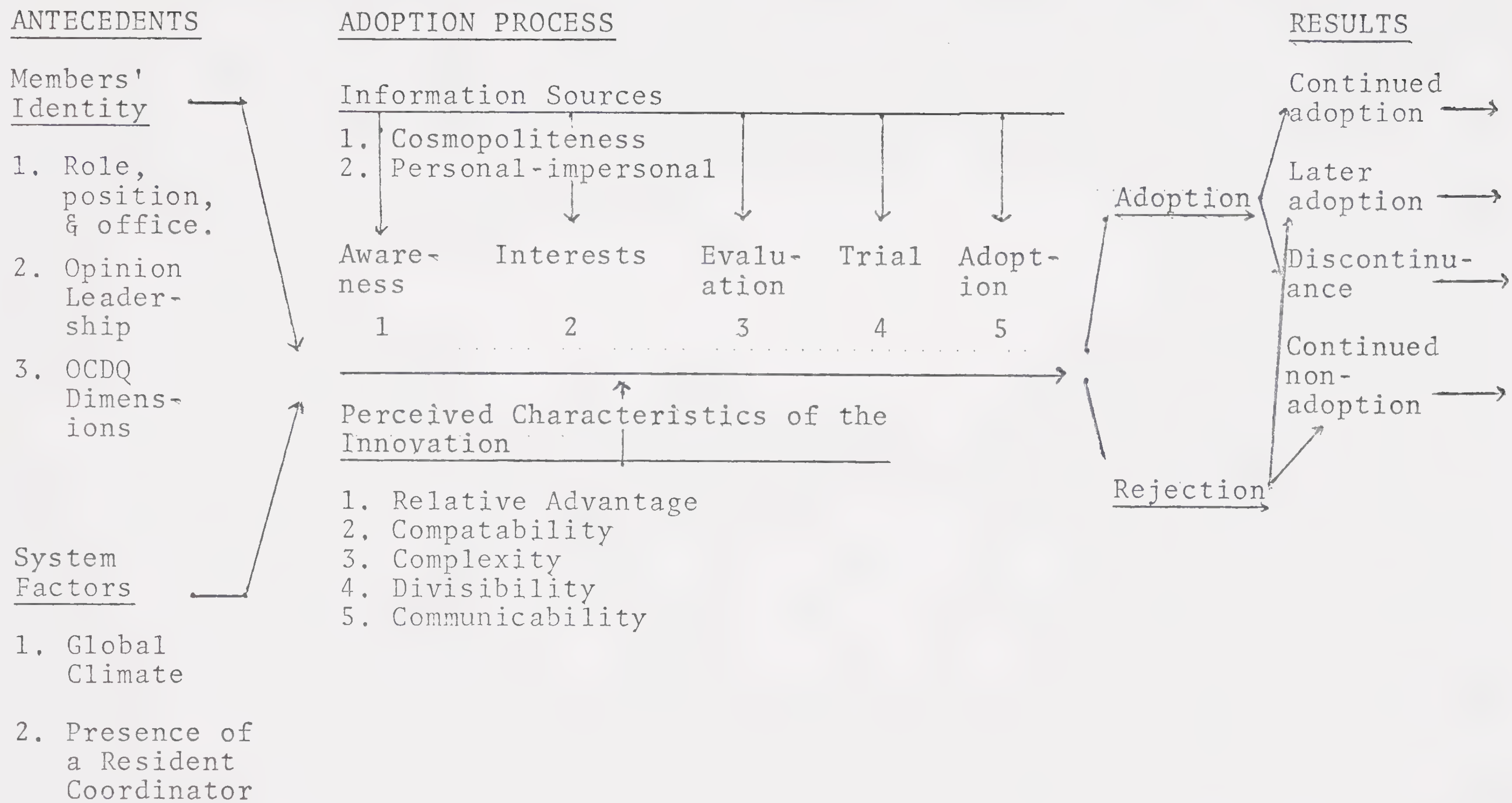
E. Katz (1963), in reviewing the research tradition on the diffusion of innovations has defined diffusion as:

> ... the acceptance over time of some specific item, idea or practice by adopting units, individuals or groups linked by specific channels of communication to a social structure and to a given system of values or culture.

Rogers' (1962) paradigm (Figure 1), describes the adoption process as including adoption stages, perceived characteristics of innovations and information sources, antecedent factors associated with the individual and the system, and the outcomes of the process. The antecedent factors and the stages of adoption are particularly relevant to this study. Organizational climate and the character-

FIGURE 2

PARADIGM OF THE ADOPTION OF AN INNOVATION WITHIN A SOCIAL SYSTEM[1]



[1]Adapted from Rogers, E.M., Diffusion of Innovations, New York: The Free Press of Glencoe, 1962, p. 306.

istics of the coordinator as an agent of change formed the antecedent factors while the pilot projects were at the trial stage of adoption.

Opinion Leader and Agents of Change

Paul Mort and his followers have generally been given credit for the initial documentation of the slow rate of change in education (Ross, 1958). Several explanations have been given for this rate in comparison with the rates of change in other fields.

Education appears to lack an identifiable change agent, a professional person whose main task is to advocate and introduce innovations. Carlson (1965) asks:

> What office in public education as we know it has responsibility for the advocacy of change? Does the function rest in the apparatus of ... departments of education? Does it rest in the office of the ... school superintendent? The answer to these questions seems clearly to be no.

MacKay (1966) observed that, if one considers the principal as a change agent, his role in the change process is open to debate and serious questioning by practitioners and theorists alike. Miles (in Carlson et al., 1965) denied the "great man" concept of the change agent, and, as did Wiens (1967), suggested that this agent is not a single factor but rather might be the state of health or setting of the organization or, in other terms, the climate.

A second explanation is that schools have a weak knowledge base about new practices because there is a lack

of scientific sources of innovations (Eichholz and Rogers, 1964). Again Carlson (1965) comments that:

> It is rare indeed when an educational innovation is backed by solid research. It is even rarer to find an educational innovation which has been fully developed and subject to careful trial and experimentation.

A third explanation lies in what Carlson (1965) termed the "domestication" of the public schools. Public schools are the kind of service organization which can neither select their clients nor be selected by their clients, Thus there is little competition among school organizations. Their existence is guaranteed and change is only sometimes encouraged and more often just condoned.

A fourth explanation (Eichholz and Rogers, 1964) is the lack of economic incentive to adopt. As Marion (1966) has reported, "there seems to be no possible profit motive in being an educational innovator." In fact, he notes, teachers and administrators who innovate face only added difficulties and risks with no prospect of financial rewards.

Glines (1967) suggested that the failure of administrators and teachers to accept the inevitability of change and to understand the accelerating rate of change has caused this slow rate of change.

To these reasons can be added those listed by Johnson and Marcum (1969), namely, the human striving for homeostasis, barriers created by sociological and psychological

influences, the conditioning of people towards obedience to authority rather than toward involvement in decision-making processes and breakdowns in the feedback processes of communications.

However, it is primarily with the first explanation, the lack of an identifiable change agent, that this paper is concerned. It has been implied by Finlay (1966) a central office official in the Edmonton Public School District, that a junior high school coordinator should act as an agent of change. As such he should fulfill at least some of the major criteria established for this position. Bennis (1966) has stated that a change agent should be a professional from outside the organization. He must be concerned with organizational effectiveness by analyzing group and interpersonal relationships. In addition, he will have some or all of powers (2), (3) and (5) following:

(1) Coercive power -- the ability of person A to reward and/or punish person B.

(2) Referent or Identification power -- power or influence accruing to person A because he is a role model to person B.

(3) Expert power -- power of a veracity associated with scientific knowledge or "truth".

(4) Legitimate or traditional power -- power stemming from the institutional norms, practices and historical-legal traditions.

(5) Value power -- power based upon the influence arising from the attractiveness the values of person A holds for person B.

Harris (1963), in considering, school supervisors, stated that "one of the major responsibilities of the school supervisor is to stimulate change." He defined supervision as that which:

> ... school personnel do with adults and things for the purpose of maintaining or changing the operation of the school in order to directly influence the attainment of the major goals of the school.

He further defined supervision in terms of ten tasks -- developing curriculum, organizing for instruction, staffing, providing facilities, providing material, arranging for in-service education, orienting new staff members, relating services, developing public relations, and evaluating.

Accordingly, the coordinator seems to be neither a change agent in Bennis' terms nor a supervisor in Harris' terms. Finlay (1966) has described the coordinator's functions as follows:

(1) To visit and observe teachers new to the system.

(2) To interpret school board policy and curriculum trends.

(3) To assist in in-service work by encouraging inter-visitation among staff members, providing and developing resource material, promoting staff projects.

(4) To assume leadership in developing cooperative teaching.

(5) To work with the Faculty of Education as a cooperating teacher and in research and curriculum projects development.

As a <u>change agent</u> the coordinator is not a professional from outside the organization. If he has any power it is probably referent, expert and value power. As a <u>supervisor</u> he lacks the status and power associated with the performance of staffing, providing facilities, relating services, fostering public relations, and evaluating. It is therefore suggested that the coordinator can be best described as an <u>opinion leader</u>.

Rogers (1962) sees <u>opinion leaders</u> as being sources of information for followers, as forming communications links with sources of innovation both from within and outside the system, as having a high degree of accessibility, and as having more experience, expertise, larger incomes, and being more innovative than other science teachers. All these criteria are fulfilled by the position of coordinator. Aside from this role, the coordinator functions also as a science teacher.

IV. SUMMARY

In this chapter the theoretical basis for this study has been presented. A human organization has been considered as an open, social system and its functional characteristics described in terms of concepts derived from general systems theory. As a system it is further defined: (a) by boundaries which distinguish it from a supra-system or environment and (b) by forming units considered as subsystems. The totality

of the subsystems has been described in terms of organizational climate. In examining these subsystems in more detail, it was suggested that the model of role episode has particular relevance.

One aspect of change in an organization occurs through the introduction of ideas and programs which are perceived as new by the individuals involved. Therefore the adoption process, and the presence or absence of a "change agent" was elaborated upon.

From the theoretical bases discussed, three suggestions are presented:

> Suggestion 1. The traditional concept of homeostasis, namely a steady state resulting from a stimulus-response-feedback mechanism, does not adequately explain change in human organizations.
>
> Suggestion 2. Organizational climate can be described as the set of role episodes within an organization.
>
> Suggestion 3. The science coordinator in a junior high school system is not a "change agent" but rather, an "opinion leader".

CHAPTER III

RELATED RESEARCH AND HYPOTHESES

The purpose of the present chapter is to examine some of the research literature which has dealt with certain variables possibly related to organizational climate, innovativeness and the role of the coordinator. The final section of the chapter will present a statement of several null hypotheses grouped under the five problems stated in Chapter I.

I. CLIMATE

In Chapter II it was indicated that organizational climate has been defined substantively as the "personality" of the organization and operationally as that which is measured by the Organizational Climate Description Questionnaire (OCDQ) developed by Halpin and Croft. It was also indicated that the individual, the group and its leadership are described by factors arising from an analysis of eight subtests and from the relationships between these subtests which produce the global climates. The sixty-four items which make up the subtests were selected, by factor-analytic techniques, from approximately 1,000 items responded to by 1,151 individuals distributed among 71 elementary schools (Halpin and Croft, 1963a). Thirty-three items make up the first four subtests which describe the

teachers' behavior. The remainder make up the other four subtests which describe the behavior of the principal as a leader.

Climate Dimensions

The categorized behaviors described by each subtest and the numbers of the items forming the subtests are as follows:

Teachers' Behavior

(1) Disengagement -- indicates the extent to which teachers work poorly together as a group. (2, 6, 10, 14, 18, 22, 26, 30, 60, 38).

(2) Hindrance -- indicates the extent to which teachers feel they are hindered by routine duties and various forms of unnecessary work. (24, 20, 16, 12, 8, 4).

(3) Esprit -- indicates the extent to which teachers feel their social needs are being satisfied and are enjoying a sense of accomplishment. (35, 31, 27, 23, 19, 15, 21, 11, 7, 3).

(4) Intimacy -- indicates the extent to which teachers enjoy friendly social relations with each other. (1, 5, 9, 13, 17, 56, 25).

Principals' Behavior

(5) Aloofness -- indicates the degree to which the principal's behavior is formal and impersonal. (57, 58, 54, 44, 34, 51, 40, 53, 63).

(6) Production Emphasis -- indicates the degree to which the principal is directive, task-oriented and exercises close supervision over his staff. (39, 43, 46, 47, 50, 61, 64).

(7) Thrust -- indicates the degree to which the principal, although task-oriented, attempts to motivate his staff through personal example. (28, 32, 36, 41, 48, 52, 55, 59, 62).

(8) Consideration -- indicates the degree to which the principal treats teachers with warmth and does extra things for them. (29, 33, 37, 42, 45, 49).

In Halpin and Croft's study (1963a), the scores of the 71 schools were standardized and factor-analyzed to determine whether certain school profiles clustered together. On this basis six organizational climates were defined that could be ranked along a continuum from Open to Closed. It should be noted that Esprit was the best single subtest as an indicator of global climate. The social interactions which characterize the six climates are as follows:

Global Climates

(1) Open Climate -- In an open climate the group enjoys a high degree of Esprit, some feeling of Intimacy, perceives little Hindrance. The individuals work well together thus producing low Disengagement. The leader sets an example with high Thrust and Consideration.

(2) Autonomous Climate -- The high scores on Esprit, Intimacy and the low scores on Disengagement indicate that there is more emphasis on the satisfaction of social needs than on task achievement. This is however, clouded slightly by the relatively high Thrust and Aloofness shown by the leader.

(3) Controlled Climate -- The high Esprit, Hindrance and Production Emphasis scores indicate that, while there is pressure for task accomplishment, group members receive a certain degree of satisfaction.

(4) Familiar Climate -- In this climate the emphasis is on the satisfaction of social needs rather than on goal accomplishment. Thus there is high Consideration, Intimacy and low Hindrance and Production Emphasis. There is also a high sense of Disengagement from tasks and duties.

(5) Paternal Climate -- The high Disengagement and Production Emphasis and the low Hindrance scores indicate that the leader fails to delegate authority and responsibility. This, along with low Esprit, Intimacy and Aloofness, seems to indicate that the group does not function smoothly.

(6) Closed Climate -- This climate is the most closed. Individuals obtain little satisfaction from their work together. The leader is ineffective both in initiating structure towards goals and in consideration of the group members. There is low Esprit, Thrust and Consideration and high Hindrance, Disengagement and Production Emphasis.

The description of each climate was derived from prototypic profiles, developed by the Halpin and Croft work (1963b). These have been reported by Miklos (1964) in the following table.

PROTOTYPIC PROFILES FOR SIX ORGANIZATION CLIMATES RANKED IN RESPECT TO OPENNESS VS. CLOSEDNESS

Climates	Group's Characteristics				Leader's Characteristics			
	Dis	Hin	Esp	Int	Al	Pe	Th	Con
Open	43	43	63	50	42	43	61	55
Autonomous	40	41	55	62	61	39	53	50
Controlled	38	57	54	40	55	63	51	45
Familiar	60	42	50	58	44	37	52	59
Paternal	65	46	45	46	38	55	51	55
Closed	62	53	38	54	55	54	41	44

In indicating the implications the scores on the subtests and the climate categories have for conditions undergoing change in a school organization Halpin and Croft (1963b) stated:

> The principal who scores high on thrust ... is willing to 'unfreeze' the organization from one stage of its development ... and to take the risk of change, confident that such change will result in a high order of organizational development which, in turn, will permit a higher congruence between the social-needs satisfaction of individual group members and the specification of their roles.

Conversely, they felt that in a closed climate, "because change represents so terrifying a threat to him [the leader], he clutters the organizational system with hindrance."

Climate Studies

Many studies have attempted to clarify the relationship between climate scores and variables such as the characteristics of communities, schools, principals and teachers, student attitudes, and relationships between the principal and his staff.

Concerning the community. Feldvebel (1964) suggested that relationships between climate and socio-economic status of a community, and climate and student achievement might exist. No relationships were found. However, relationships were observed to exist between three of the subtests and the two variables examined. *Hindrance* was found to relate negatively to socio-economic status while *Consideration*

related positively. There was the suggestion that the more affluent the community the more clerical-administrative resources the schools had and thus the lower the _Hindrance_. Also, _Consideration_ was directly related to training and experience of the teaching staff, which in turn varied directly with the socio-economic level of the community. Student achievement was found to relate directly to _Production Emphasis_ and _Consideration_. However, Feldvebel concluded that the relationships between the global concept of climate, socio-economic status and student achievement were more complex than the study admitted.

Concerning the school. Several studies have examined climate and certain characteristics of schools. Richens (1967) found no relationship between climate and size and location of school, though he did conclude that the OCDQ was a reliable and valid instrument. Keis (1967) also found no relationship between global climate and size or kind of school (junior or senior high schools). However, he found a direct relationship between climate and the degree of staff turnover. Low turnover schools had _Open_ or _Autonomous_ climates while high turnover schools had _Paternal_ or _Closed climates_. Also, junior high schools were characterized as having high _Thrust_, _Production Emphasis_ and _Consideration_ while senior high schools showed high _Aloofness_. Both _Aloofness_ and _Hindrance_ related directly to school size.

On the other hand, Andrews (1965) observed that schools with grades one to twelve were more closed than were elementary and/or junior high schools. He concluded that the OCDQ was as valid for other kinds of schools as for the elementary schools sampled by Halpin and Croft.

Concerning principals and teachers. Studies which examined the relationships between the global aspect and subtests aspects of climate on the one hand and the variables associated with principals and teachers on the other found: (a) that no overall relationship existed between climate and the principal's personality type as measured by the Myer-Briggs Type Indicator though all subtests except Production Emphasis showed significant "F" ratios with all eleven personality types in the directions expected (Plaxton, 1965); (b) that no relationship existed between climate and patterns of teacher classroom behavior based on Ryan's classification, that the principal's influence on climate may be less than the OCDQ assumes it to be but has some effect in terms of length of service in the school (Harvey, 1965); (c) that principals in Open climate schools were better able to predict teacher perceptions of the climate (Wall, 1967); (d) that student attitudes towards school varied directly with Production Emphasis, Thrust, Esprit and Intimacy, varied negatively with Aloofness, but were unrelated to the global aspects

of school climate (Pyra, 1965); (e) that there were strong relationships between both the global climate categories and Esprit and teacher satisfaction (Andrews, 1965).

Concerning informal organizations. Heller (1968) postulated that the perceptions of the climate of a school by members of informal groups and the total membership of the organization were the same. He found that this was true when both groups considered the existing climate and when they expressed a preference for a desired climate. He concluded that there was congruence of perception of the global climate both among informal groups and between informal groups and the total membership. This is consistent with the theoretical suggestions previously presented in Chapter II.

Concerning innovativeness. Few studies have related climate to innovativeness. Hughes (1965) examined the climates of the central administration offices of school districts rated as highly innovative and highly non-innovative. By slightly modifying the OCDQ he was able, validly, to describe the superintendents' relationships with their staffs. He hypothesized that innovative districts had more open climates in their central office than did non-innovative districts, and that the two categories of districts differed significantly on all the subtests except Intimacy. His first hypothesis was substantiated. He found also that

more innovative districts show less _Disengagement_, more _Esprit_, and had higher _Thrust_. Hughes concluded that the OCDQ is a useful indicator of a potentially innovative atmosphere but is inadequate as a single instrument.

Most recently Johnson and Marcum (1969) hypothesized: (a) that there were differences in climate between the most and the least innovative schools; (b) that the teachers and the administrator in each of the two groups of schools perceived the climate differently; (c) that there were differences in age, years of service, number of staff, and expenditures per pupil between the two groups of schools. Johnson and Marcum used the OCDQ to determine whether or not each of thirty schools, previously identified as either innovative or non-innovative, had either _Open_ climates or _Closed_ climates. They found an OCDQ mean score of 58 for the most innovative category and a 37.87 mean score for the least innovative category. Since these findings produced an "F" ratio which warranted rejection of their null hypothesis, they concluded that innovative schools had _Open_ climates and less innovative schools had _Closed_ climates. They also found that both the teachers and the administrator in non-innovative schools perceived the climate as _Closed_ while those in innovative schools perceived the climate as _Open_ though the administrators viewed the climate as more _open_ than did the teachers. Lastly, they reported that highly innovative schools spent more per child, had a younger staff, had

greater staff turnover and were larger schools. They concluded that organizational climate is an important condition for change.

The findings of the Johnson and Marcum study, must however be viewed cautiously. Since the OCDQ measures the perception of certain role relationships, it is difficult to understand how one can determine the perceptions of a perception as was suggested in their second hypothesis (cf. ante). It is also difficult to determine on what basis six categories, an essential feature of Halpin and Croft's work, could be reduced to two, namely, Open and Closed. One also wonders how Johnson and Marcum could derive the climate from the mean of the subtests of the OCDQ since climate is described on the basis of a profile of the relative proportion of one subtest score to another (cf. ante). These considerations also cast doubt on the validity of the finding, namely that large size and short staff tenure (rapid staff-turnover) are positively related to openness of climate especially since other studies (cf. ante) have shown either no relationships or negative relationships. Finally, it would seem difficult to justify the exactitude of the statement that the school principal "alone is the chief agent in the openness or closedness of the climate."

Most of these studies have been concerned with discrete variables. Few have attempted to relate climate to

other generalized phenomena characteristic of organizations. A notable exception is the study by Heller (1968) which examined differences in climate perception by members of small informal groups within the organization and the perceptions of the organization's membership as a whole. Other significant studies by Hughes (1965) and Johnson and Marcum (1969) examined climate and innovativeness in terms of: (a) the central office climate (Hughes, 1965) and (b) certain schools in one system (Johnson and Marcum, 1969).

II. INNOVATIVENESS

Most studies on innovativeness in schools have arisen from the Paul Mort tradition, have drawn heavily upon the models, concepts and insights derived from rural sociology as presented by Rogers, Katz, and Lionberger, and have attained a specificity due largely to Carlson's work. Much of the theoretical background of the following studies has been presented in Chapter II of this study. The background omitted from this study is that which deals with the adoption of innovations over time, as exemplified by Rogers' (1962) categories of adopters, namely that <u>innovators</u> form 2 1/2 per cent of a normal population, <u>early adopters</u> 13 1/2 per cent, <u>early majority</u> 34 per cent, <u>late majority</u> 34 per cent and <u>laggards</u> 16 per cent. Like climate studies, most innovation studies have attempted to

establish relationships between certain features of the adoption process (*cf. ante*, Fig. II) and discrete variables associated with characteristics of the community, the school, the teachers, the principal, and the superintendent.

For this study, characteristics of the school, the teachers and the principal are most relevant.

Concerning the school and community. Positive relationships have been observed between the number of innovations and (a) the socio-economic level of the community (Holdaway, 1966), and (b) the size and type of school in that junior high schools were more innovative than combined elementary-junior high schools (Yakimishyn, 1967).

Concerning teachers. In terms of demographic characteristics Yakimishyn (1967) found positive relationships between innovativeness and (a) age (if teachers were between 26 years and 40 years of age); (b) total experience (if teachers had seven to seventeen years of experience); (c) three to five years of post-secondary school formal education (above and below these years teachers were less innovative); (d) membership in subject area associations. He found no significant differences regarding sex and marital status.

In terms of personality and attitude characteristics

of teachers Jenkins (1967) found that innovative teachers showed great originality and knowledge of subject, and were more dominant, radical, flexible, adventuresome, disorderly, and complex. Banning (1954) observed that teachers with a conservative, rigid personality structure did not easily accept curriculum change and had limited effectiveness in pupil-teacher, teacher-administrator, and teacher-community relationships. Such teachers felt that curriculum decisions should be handed down through formal lines of communication. Teachers with attitudes favourable to curriculum change felt a real sense of participation in curriculum decision-making.

Two studies which have taken a much broader basis have permitted an examination of teacher innovativeness in terms of the organization as a system and in terms of role relationships. Innovativeness was seen to be related to the state of the system as well as to factors in the external environment (Doughty, 1966; Wiens, 1967).

Doughty showed (a) that teacher perceptions of security and good interpersonal relationships were essential for effecting change; (b) that in-service training, supervisory help, and administrative guidance were not perceived as having an appreciable value in implementing change. Teachers felt that their own effort determined, almost entirely, the success of the innovations. However, the findings were contradictory. Though teachers perceived themselves as

relatively independent, autonomous, professional, and as welcoming worthwhile innovations, they seldom instigated change and welcomed detailed guidelines if conditions had to be changed.

These observations accord well with Wien's study (1967) in that (a) holders of positions of authority were not necessarily those whose attitude towards change determined the level of innovativeness of the system and (b) influentials (Rogers, 1962, Chap. VIII) as perceived by teachers, were the people most significantly related to innovativeness.

Concerning principals. Seger (1966) and Marion (1966) found positive relationships between innovativeness and the extent of the principal's professional activities and recency of post-secondary school formal education. Negative relationships were found between innovativeness and the principal's age and years of experience. No significant relationships were found with salary, tenure, and level of university education.

In terms of personality and attitude characteristics the same authors found positive relationships with cosmopoliteness and opinion-leadership and negative relationships with mental rigidity and the individual's value system. Innovative principals tended to feel that innovation was not desired by a central office, that students and teachers were the best judges of their work,

and that they were highly innovative.

In a more general study Chesler *et al.* (1963) noticed (a) that principals with innovative staffs were more professional, were less administration oriented, were more concerned with improving instruction, encouraging teacher growth and continual evaluation of students, and were less concerned about the demands of administrative superiors; and (b) that principals with accurate perceptions of teacher's feeling and values generally had more innovative staffs while those who related formally and with a lack of consideration had less innovative staffs.

Concerning the superintendent. The numerous studies relating innovativeness to various characteristics of the superintendent such as those reported by Carlson (1965) have little direct relevance to this study. However, in view of the previously mentioned studies which dealt with teachers and principals, Earle's work (1968) on the perception of innovativeness by school superintendents in Canadian systems is of interest. According to Earle, superintendents felt that the significant sources of influence for innovativeness came from within and not from outside the system, and that they themselves were the most significant single influence on innovativeness. They also felt that teachers exercised as great an effect on innovativeness as did the school boards and provincial departments of education. These findings, however, may have been influenced by situations

in which many superintendents are in more frequent contact with various levels of government and the community than they are with their teaching staffs.

III. COORDINATOR'S ROLE

The role of the junior high school coordinator was examined in some detail by Hewko (1965). The school system which he used was the same as that used by this study. He reviewed some of the changing concepts in school supervision in terms suggested by Andrews (1960), namely that program development, evaluation, and motivation were provided for by superintendents, their assistants, supervisors, and principals. Hewko concluded that consultation in specific subjects should be the province of the coordinator. He surveyed the perceptions of the role of coordinator as held by central office officials, principals and their assistants, coordinators and teachers after the role had been established for four years. There was general agreement that coordinators should (a) encourage teacher experimentation, (b) act as a liason between teachers and the central office, (c) develop course outlines for new teachers, (d) assist teachers in selecting aids, references and ensuring the availability of this material, (e) organize in-service training programs, (f) visit classrooms on invitation only, (g) give demonstration lessons, and (h) should not give direct counseling or evaluate teachers. Hewko concluded that consultation and

not coordination is the coordinator's main function, that teachers had vaguer perceptions of the role than had principals and supervisors, that coordinators, since they were and are classroom teachers, had insufficient time for their extra duties; that coordinators felt a strong lack of job definition; that non-resident coordinators were not utilized as much as resident coordinators; and that the coordinator felt himself to be hampered by various antagonisms and apathy. Some of the same concerns, with different emphases and to different degrees, were expressed at a general meeting of coordinators held at the Edmonton Public School Board office in February, 1969.

IV. SUMMARY AND HYPOTHESES

Generally all studies which have examined either climate or innovativeness have done so in terms of discrete, and sometimes unique, characteristics of the various units of the populations, or systems, being examined. As has been implied in Chapter I the units of a complex open system can best be described in terms of relationships, since it is suggested that only those discrete characteristics of the units which are involved in the relationships under study are the relevant characteristics. Of the studies cited only Wiens (1967) adopted this approach. Only two studies were found which related, at different organizational levels and with varying degrees of success, school organizational

climate and innovativeness.

Problems and Hypotheses

Arising from the general and more specific statements of the problem, from the delimitations and limitations, and from the theoretical background, the following hypotheses, stated in the null form, were developed. They have been organized into major and minor problems and hypotheses. The major problems have innovativeness as the dependent variable while organizational climate, the presence of a resident coordinator, and certain leadership characteristics of the coordinator are the independent variables. The minor problems essentially examine the correlations between climate and the presence of a resident coordinator and between opinion-leader and general leadership characteristics of the coordinator.

Major Problems and Hypotheses

Problem I. Is there a relationship between innovativeness and organizational climate?

Null Hypothesis IA. There is no significant relationship between the numbers of innovations in use in a school and the global climate of that school.

Null Hypothesis IB. There is no significant relationship between the extent of innovativeness

in a school and the _global climate_ of that school.

Null Hypothesis IC. There is no significant relationship between the _numbers of innovations_ in use in a school and the conditions described by each of the _eight subtests of organizational climate_.

Null Hypothesis ID. There is no significant relationship between the _extent of innovativeness_ in a school and the conditions described by each of the _eight subtests of organizational climate_.

Problem II. Is there a relationship between innovativeness and the presence of a resident coordinator?

Null Hypothesis IIA. There is no significant relationship between the _number of innovations_ in use in a school and the _presence of a resident coordinator_.

Null Hypothesis IIB. There is no significant relationship between the _extent of innovativeness_ in a school and the _presence of a resident coordinator_.

Problem III. Is there a relationship between innovativeness and certain leadership

characteristics of a coordinator?

Null Hypothesis IIIA. There is no significant relationship between the numbers of innovations in use in a school and a coordinator's score on a self-designating opinion-leader scale.

Null Hypothesis IIIB. There is no significant relationship between the extent of innovativeness in a school and a coordinator's score on a self-designating opinion-leader scale.

Null Hypothesis IIIC. There is no significant relationship between the numbers of innovations in use in a school and a coordinator's leadership characteristics as described by each of twelve subtests of leadership behavior.

Null Hypothesis IIID. There is no significant relationship between the extent of innovativeness in a school and a coordinator's leadership characteristics as described by each of twelve subtests of leadership behavior.

Minor Problems and Hypotheses

Problem IV. Is there a relationship between the

organizational climate of a school and the presence of a resident coordinator?

Null Hypothesis IVA. There is no significant relationship between the _global climate_ of a school and the _presence of a resident coordinator_.

Null Hypothesis IVB. There is no significant relationship between the conditions described by each of _eight subtests of climate_ and the _presence of a resident coordinator_.

Problem V. Is there a correlation between an _opinion-leadership score_ of a coordinator and certain _leadership characteristics_ of the coordinator?

Null Hypothesis V. There is no significant correlation between a _coordinator's score on a self-designating opinion-leader scale_ and a coordinator's _leadership characteristics_ as described by each of twelve subtests of leadership behavior.

CHAPTER IV

COLLECTION AND TREATMENT OF DATA

To test the hypotheses presented in the previous chapter, data were obtained describing the science teachers, the science coordinators and the junior high schools. This data will be presented and the eleven pilot projects listed and briefly discussed in this chapter. Five instruments, three developed for this study and two already existing, will be described, and the method of their administration outlined. Finally, the methods of treating the data, both for descriptive purposes and for testing the hypotheses, will be outlined.

I. DATA COLLECTION

Permission was obtained from the Edmonton Public School Board to contact and collect data from all principals of schools having grades seven and/or eight and/or nine, from all teachers teaching at least one science class in these grades and from all junior high school science coordinators. Thus the total population of schools having these grades, science teachers and science coordinators was surveyed.

Five instruments (see Appendix A), the Organizational Climate Description Questionnaire (OCDQ), the Leadership Behavior Description Questionnaire - Form XII (LBDQ), the

School Characteristics Questionnaire (SCQ), the Teacher Characteristics Questionnaire (TCQ), and the Coordinator Characteristics Questionnaire (CCQ) were distributed in envelopes. Each principal, teacher and coordinator received an accompanying letter explaining the study and the method of responding to the pertinent questionnaires (see Appendix B). The envelopes and contents were coded both for each school and for each of three groups, namely principals, teachers and coordinators. The instruments were left with each principal to be distributed within his school. Four days later, a week-end having intervened the sealed envelopes were collected.

This approach provided opportunities for the investigator to meet the principal, the coordinators and many science teachers and to assess, casually, the "climate" of the school. In view of the percentage of returns and the discussions with the staff of each school both before and after the questionnaires were completed, the four days spent in collecting data were profitable ones.

Principals were asked to complete the SCQ and the OCDQ. To each instrument forty-three principals, 97.7 per cent, responded, with no spoiled returns (see Appendix C).

The science teachers were asked to complete the TCQ, the OCDQ and the LBDQ. There was a 78.2 per cent (135/174) response on the TCQ with 6.3 per cent (11/174) returns spoiled. On the OCDQ there was an 80 per cent (139/174)

response with 3.4 per cent (6/174) returns spoiled (see Appendix C). *Spoiled returns* were those questionnaires which, though not completely blank, contained data on innovations and demographic characteristics which were contradictory or significantly incomplete.

The responses by the science teachers to the LBDQ were considerably lower. Table I shows that there was a 60.6 per cent (105/174) response of completed returns and a 17.6 per cent (31/174) response of spoiled returns. The responses were grouped as coming either from schools with or without resident coordinators. It is seen that 26/31 spoiled returns and 28/38 nil responses came from schools without resident coordinators. *Spoiled returns*, in this case, refers to returns on which the teachers indicated that they had never met or had seldom seen the science coordinator for their zone and were therefore unable to evaluate him. This lack of response appears to be related to the coordinators' general feeling of dissatisfaction with their own performance in schools other than the ones in which they teach (*cf. post*).

TABLE I

DISTRIBUTION AND RETURNS OF THE LBDQ BY SCIENCE TEACHERS

Science Teachers	Number of LBDQs						
	Distributed	Nil Response		Spoiled Returns		Complete Returns	
	No.	No.	Per cent	No.	Per cent	No.	Per cent
In Schools with Resident Coordinator	44	10	22.7	5	11.3	29	66.0
In Schools without Resident Coordinator	130	28	21.3	26	20.0	76	58.7
Total Science Teachers	174	38	21.8	31	17.6	105	60.6

II. INSTRUMENTS USED

From the previously mentioned instruments, data were obtained which measured: (a) the number of innovations and extent of innovativeness in terms of each school and each coordinator, (b) the global climate and climate dimensions of each school, and (c) the leadership and opinion-leader characteristics of each coordinator. These measurements will be described in this section. The status of the schools and coordinators as revealed by each instrument will be presented and discussed in Section IV.

Organizational Climate Description Questionnaire (see Appendix A)

Description. Climate has been operationally defined in Chapter II as that which is measured by the OCDQ. Its reliability has been determined by Brown to be "high enough to be encouraging" (Harvey, 1965). Its validity has been established by Andrews (1965) in a summary of studies involving 165 Alberta schools. One must stress that although the six climate categories cannot be defined too precisely, the subtests have been shown to have significiant relationships with many dependent variables (cf. ante Chapter III).

Treatment. The OCDQ requires that the respondents indicate, on a four point Likert-type scale, the frequency with which a certain characteristic is perceived to occur. The school score on each subtest is the mean of all respondents' scores on that subtest. Each subtest score was obtained by summing the values of each item contributing to that subtest (cf. ante Chapter III for a list of subtests and the items forming each). The school's subtest score was then standardized to a mean of 50 and a standard deviation of 10. This gave the school a standardized profile composed of the values of eight subtests. The profile was compared with each of the six previously described prototypic profiles (cf. ante). The global climate of the school is the climate of that prototypic profile which results in the lowest sum of the absolute differences between the comparable

subtests of each profile. Halpin and Croft (1963b) found the establishment of the degree of congruence through similarity scores to be the simplest and quickest method for determining global climates. However, some reliability is lost in using this method, since any pattern of discrepancy across the eight subtests has been weakened by concentrating upon the absolute differences between comparable subtest scores. However, this loss has been accepted in succeeding studies (*cf.* *ante* Chapter III). The discrepancy scores have proved to be difficult to isolate and identify when they are derived by comparing the factor loadings of an observed profile with the factor loadings of a prototypic profile. It is suggested that this loss has contributed, at least in part, to the general dissatisfaction expressed concerning the descriptive and predictive value of the climate categories as contrasted with the climate subtests.

Leadership Behavior Description Questionnaire - Form XII
(see Appendix A)

The LBDQ was developed by Stogdill (1963) and his associates to obtain a description of a group leader from the members of his group. Numerous studies, as reported by Stogdill (1963), have identified two underlying factors of leadership as *Consideration* and *Initiation of Structure*. The LBDQ was developed through Stogdill's dissatisfaction with the belief that only two factors described all

observable variance in leader-behavior. The present form represents the fourth revision.

Description. The LBDQ is composed of twelve subtests which, unlike those forming the OCDQ, are not combined to form a single score. Each subscale is composed of either five or ten items. Brief definitions of the subscales and the numbers of the associated questionnaire items (see Appendix A) are listed below:

(1) Representation - speaks and acts as the representative of the group. (5 items -- 1, 11, 21, 31, 41).

(2) Demand Reconciliation - reconciles conflicting demands and reduces disorder to system. (5 items -- 51, 61, 71, 81, 91).

(3) Tolerance of Uncertainty - is able to tolerate uncertainty and postponement without anxiety or upset. (10 items -- 2, 12, 22, 32, 42, 52, 62, 72, 82, 92).

(4) Persuasiveness - uses persuasion and argument effectively; exhibits strong convictions. (10 items -- 3, 13, 23, 33, 43, 53, 63, 73, 83, 93).

(5) Initiation of Structure - clearly defines own role, and lets followers know what is expected. (10 items -- 4, 14, 24, 34, 44, 54, 64, 74, 84, 94).

(6) Tolerance of Freedom - allows followers scope for initiative, decision, and action. (10 items -- 5, 15, 25, 34, 45, 55, 65, 75, 85, 95).

(7) Role Assumption - actively exercises the leadership role rather than surrendering leadership to others. (10 items -- 6, 16, 26, 36, 46, 56, 66, 76, 86, 96).

(8) Consideration - regards the comfort, well being, status, and contributions of followers. (10 items -- 7, 17, 27, 37, 47, 57, 67, 77, 87, 97).

(9) <u>Production Emphasis</u> - applies pressure for productive output. (10 items -- 8, 18, 28, 38, 48, 58, 68, 78, 88, 98).

(10) <u>Predictive Accuracy</u> - exhibits foresight and ability to predict outcomes accurately. (5 items -- 9, 29, 49, 59, 89).

(11) <u>Integration</u> - maintains a closely knit organization; resolves inter-member conflicts. (5 items -- 19, 39, 69, 79, 99).

(12) <u>Superior Orientation</u> - maintains cordial relations with superiors; has influence with them; is striving for higher status. (10 items -- 10, 20, 30, 40, 50, 60, 70, 80, 90, 100).

A high reliability and validity of the subscales has been established by Stogdill (1963).

<u>Treatment</u>. The LBDQ requires that the respondents indicate, in a five point Likert-type scale, the frequency with which a certain behavior of the science coordinator is perceived to occur. A coordinator's score for each of the twelve subtests was the mean of all respondents' scores concerning that coordinator on each subtest. Each subtest score was the sum of the values of the items contributing to that subtest. Since the subtests contained either five or ten items, the maximum score on each was either twenty-five or fifty. Following standard practice, the scores are not reported in standard form. However, for comparative purposes, subtests with a maximum score of twenty-five are converted to give a maximum of fifty.

In this study, the LBDQ was used to describe the science coordinator as a leader of science teachers in terms

of innovativeness. It has been suggested (cf. ante Chapter II) that a coordinator can be considered primarily as an opinion-leader. One would therefore expect that the sub-tests of the LBDQ which relate most closely to opinion-leader scores would also be those on which the coordinator is rated highest by his group members.

Characteristics Questionnaires (see Appendix A)

The information derived from these three instruments, namely the SCQ, the TCQ and the CCQ, was used: (1) to describe certain characteristics of the coordinator's role behavior and perceptions, (2) to describe the school, the science teachers and the science coordinators, and (3) to define the populations upon which the hypotheses were based.

Regarding this third use, the hypotheses can be considered in three groups. The first group, namely those dealing with innovativeness and climate and climate and the presence of a resident coordinator, was tested with data from forty-three schools. The second group, dealing with innovativeness and the presence of a resident coordinator, utilized data from all schools having an assistant principal who had not been a science coordinator, i.e., thirty-eight schools (cf. post). The third group examined certain characteristics of the coordinator and thus was based upon the total population of ten coordinators.

The fourth use of this information was for the

derivation of the indices of innovativeness.

Treatment. Three indices of innovativeness were developed by Holdaway and Seger (1968) to measure the number of innovations, the extent of innovativeness and the time to "adoption stage" of an innovation when innovativeness was considered as a dependent variable. They concluded that innovativeness was a distinct factor in a school and that the three indices, though related, were not predictable, one from the other. From their work two similar indices of innovativeness were developed for this study.

The first index, the number of innovations (I_1), measured the number out of a maximum of eleven pilot projects under implementation in each school. Each school was assigned one point for each project, thus each school could receive an Index I_1, from zero to eleven.

The second index, the extent of innovativeness (I_2), measured the degree to which the science teachers in a school were using the pilot projects. The essential assumption underlying this index was that if one project was in operation in one school then all science teachers in that school had equal awareness of that project. To derive Index I_2, each science teacher was given a score which was equal to the number of different pilot projects used by that teacher. The scores of all science teachers in one school were summed. The sum of teachers' scores formed a ratio

with the total number of science teachers in that school. In order to provide for the assumption of equal awareness, the ratio was multiplied by the Index I_1. Thus if a school had five science teachers of whom three were using Project A, one was using Project B, and one was using Project C, the Index I_1 would be three and the Index I_2 would be three since

$$I_2 = \frac{\text{sum of teachers' scores}}{\text{no. science teachers}} \times I_1 = \frac{3+1+1}{5} \times 3 = 3.0$$

Index I_2 therefore is a ratio in which the numbers of science teachers controlled for school size.

When N=43, these two indices correlated at .67 which was significant at better than the .01 level of confidence. However, the tests of the hypotheses (*cf. post* Chapter V) show that the indices are not predicted by the same independent variable.

The Self-Designating Opinion-Leadership Scale formed part of the Coordinator Characteristics Questionnaire (see Appendix A). This scale was a modified version of the scale devised by Rogers (1962), and measured the degree to which each coordinator perceived himself to be an innovator in the innovation process. Modifications were made to change the words "friends or farmers" and "farming practices" to "teachers" and "teaching practices" respectively. Rogers found that the split-half reliability was .703 and that the coefficient of reproductability, a measure of

unidimensionality, was 91.4 per cent on a Guttman Scale analysis (Rogers, 1962). Thus he concluded that the scale is reliable, unidimensional and valid. There is no evidence that the two modifications have altered these characteristics. The scale was scored in the following manner:

Item Number	Correct Answer	Score
1	yes	1 point
2	a	1 point
3	a	1 point
4	b	1 point
5	a	1 point
6	yes	1 point

The coordinators who scored high were considered to be more influential than those who scored low.

IV. CHARACTERISTICS OF THE INNOVATIONS

The criterion used for determining the innovativeness of each school was the use of eleven pilot projects, textbooks and/or curriculum programs. Throughout this study the two measures of innovativeness, namely, the number of pilot projects used in each school and the extent of their use have been considered as the dependent or criterion variables.

Though each of the eleven programs and/or textbooks has certain unique characteristics, for this study the following common features are significant:

(1) Each has been written since 1962 and introduced into the Edmonton Public School system between January 1966

and January 1968.

(2) Each has been voluntarily adopted by teachers using it.

(3) Each was perceived to be a pilot project or innovation by the central office of the school system, the Department of Education of the Province of Alberta and the Department of Secondary Education, University of Alberta.

(4) Each is characterized by a process-inquiry approach to teaching the substance and syntax of the various science disciplines but differs in the method of developing this approach.

(5) Each stresses a simplicity of equipment, techniques and laboratory facilities.

In a more detailed manner the projects can be described as follows:

(1) Secondary School Science Project (Princeton Project) - an interdisciplinary physical science course. It relies upon independent study, laboratory investigation and discussion groups as methods of teaching science. There is no hard-bound textbook. The printed matter is a series of investigations each accompanied by a Student Record Book (Lockard, 1968). It was developed for the eighth grade.

(2) Introductory Physical Science - a junior high school course in the physical sciences. It was prepared by the Physical Science Study Committee of the Educational

Development Center, Massachusetts, U.S.A., to prepare students for further work in physics. Laboratory work is central with guidance being given through a textbook. The main emphasis is the study of matter and energy and measurement of these (Lockard, 1968). It was developed for the ninth grade.

(3) Nuffield Biology "O" Level, Book I - a Nuffield foundation science teaching project which attempts to incorporate discovery learning into a biology course. It is oriented towards laborary and field activities which form an integral part of the textbook. It is used at the seventh grade level.

(4) Earth Science Curriculum Project - an approach to the study of earth science which stresses its inter-disciplinary aspects. While emphasizing laboratory investigation the course is textbook-centered. It was developed for the eighth and ninth grades.

(5) Exploring Science Series - a three year program which is an extension of the K-6 series of the same name and developed by the same author. Three grades, seven to nine, are represented by three textbooks, Exploring Life Science, Exploring Earth Science and Exploring Physical Science respectively. The topics covered in each book were selected on the basis that these topics lend themselves to in-depth explorations in the laboratory and in the field.

(6) Concepts in Science Program - an extension, through grades seven to nine, of the K-6 program. It attempts to serve as a preparation for courses in biology, elementary chemistry and physics. The three textbooks used are: Life: Its Forms and Changes, Matter: Its Forms and Changes, and Energy: Its Forms and Changes, respectively. The program is frankly developed upon six conceptual schemes some of which run vertically through the K-6 sections and horizontally through each of the grade seven to nine levels. Investigations which are highly structured or unstructured and graduated in difficulty are emphasized.

(7) Physical Science: A Laboratory Approach - a program and textbook which emphasizes the nature of science as an activity. Students are expected to develop conceptual understandings of the structure of matter and the nature of energy and to conclude that the kinetic-molecular theory is the best current explanation for the relationship between matter and energy. It is used at the grade nine level.

Commencing in 1969, the Department of Education, Province of Alberta will be introducing a "Life" science program in grade seven, an "Earth-Space" program in grade eight and a "Physical" science program in grade nine. Though there will be authorization of textbooks at each grade, it appears that six of the eleven pilot projects will be stressed, namely -- Nuffield Biology, "O" Level, Book I and Exploring Life Science for grade seven,

Secondary School Science Project and Exploring Earth Science for grade eight, and Physical Science, Lab Approach and Exploring Physical Science at grade nine (N.J. Andruski, 1969, pers. comm). The voluntary aspects presently associated with the use of these six projects will diminish during 1969 and will have disappeared by 1970.

All eleven projects are presently in the "trial stage" with the above six approaching the "adoption stage".

V. CHARACTERISTICS OF THE SYSTEMS AND SUB-SYSTEMS

Each school was considered to be a separate system, a major characteristic of which is the climate. Within each school science coordinators and science teachers act in role relationships, which result in certain outcomes which, in this case, are the trials of pilot projects. Thus three populations have been identified: (1) number of schools was forty-three; (2) though the total junior high school science teacher population was 177 teachers, three teachers had special classes, or were substitute teachers. Thus the total population of science teachers was 174, of which 135 replied to the TCQ, 139 to the OCDQ and 105 to the LBDQ; (3) the number of science coordinators was ten, the total population.

The Schools

It was possible to categorize the forty-three schools in at least two ways. The first category would have distinguished between those schools containing only grades seven, eight and nine and those schools containing at least one of these grades plus others (hereafter called combined schools). The second category would have considered all schools which contained at least one of grades seven, eight and nine. This last classification was adopted. However, Appendix D presents climate, innovativeness and demographic data according to the first category.

Three major school characteristics will be identified, namely the size as determined by the numbers of science teachers, the climate, and the innovativeness.

Table II shows that the schools had a mean of 4.6 science teachers. Over 80 per cent of the schools had fewer than seven teachers. As Appendix D3 shows, this 80 per cent was formed mainly from combined schools since there were sixteen schools with only grades seven, eight and nine and twenty-seven schools which were combined. The high percentage of schools with fewer than seven science teachers is significant since the climate of the schools, as perceived by a few science teachers, may not be congruent with a climate as perceived by a random sample of all teachers in each school. In some cases there was only one teacher and

a principal to respond to the OCDQ.

TABLE II

FREQUENCY DISTRIBUTION OF SCHOOL SIZE BY NUMBERS OF SCIENCE TEACHERS

Number of Science Teachers	Total Schools (N=43) f	Per cent
13 - 15	1	2.3
10 - 12	2	4.7
7 - 9	5	11.6
4 - 6	17	39.5
1 - 3	18	41.9
Mean	4.6	
S.D.	2.87	

As Table IIIA reveals, the percentage distribution of the population in terms of climate is similar to that found by Andrews (1965) and Halpin and Croft (1963). However the present population has a greater percentage of open climate (28 per cent), closed climate (32.5 per cent), and familiar climate (11.6 per cent) schools than had Andrew's population. Closer approximation with the findings of Andrews might have resulted with a larger school population and/or more science teacher respondents per school and/or a random sampling of all teachers in each school.

TABLE IIIA

PERCENTAGE DISTRIBUTION OF THE CLIMATE OF THE PRESENT POPULATION OF SCHOOLS COMPARED WITH ANDREW'S SAMPLE AND HALPIN AND CROFT'S SAMPLE

Climate	Present Population Per cent	Andrew's Sample Per cent	Halpin & Croft Elementary Schools Per cent
Open	28.0	24	24
Autonomous	9.3	13	8
Controlled	9.3	17	18
Familiar	11.6	8	12
Paternal	9.3	17	11
Closed	32.5	21	27
Total Percentage	100.0	100	100
Number of Schools	43	165	71

Table IIIB shows that there was a greater percentage of schools without a resident coordinator at the extremes of the climate continuum when the population was divided into schools having resident coordinator and those not having a resident coordinator. The weighting of the Familiar Climate category seems to come from schools with resident coordinators. It remains to be determined whether or not the science coordinator contributes significantly to a climate.

TABLE IIIB

FREQUENCY DISTRIBUTION OF SCHOOLS WITH AND WITHOUT RESIDENT COORDINATORS BY CLIMATE CATEGORIES

Climate	Schools with Resident Coordinators (N=10)		Schools Without Resident Coordinators (N=33)		Total (N=43)	
	f	Per cent	f	Per cent	f	Per cent
Open	2	20.0	10	30.3	12	28.0
Autonomous	2	20.0	2	6.0	4	9.3
Controlled	1	10.0	3	9.1	4	9.3
Familiar	3	30.0	2	6.0	5	11.6
Paternal			4	12.2	4	9.3
Closed	2	20.0	12	36.4	14	32.5

Table IV indicates that 25 per cent of the schools were not innovating. Of a possible eleven different innovations, the maximum in any one school was six, while the average per school was 2.2. The standard deviation was 1.72. Thus the range of innovativeness found within the population was not great. The maximum extent to which innovativeness was occurring was 15.5. Two schools were at this level. The mean extent of innovativeness was 2.9 with a standard deviation of 4.03. Thus there was considerably more diversity among schools on the scale of Index I_2 than on Index I_1. Again the low innovativeness of the systems is revealed by approximately 60 per cent of the schools having an I_2 ranging from 0 to 1.9.

TABLE IV

FREQUENCY DISTRIBUTION OF SCHOOLS BY THE NUMBER OF DIFFERENT INNOVATIONS (I_1) AND THE EXTENT OF INNOVATIVENESS (I_2)

I_1 values	Schools (N=43) f	Per cent	I_2 values	Schools (N=43) f	Per cent
11			15.0-15.9	2	4.7
10			14.0-14.9		
9			13.0-13.9		
8			12.0-12.9	1	2.3
7			11.0-11.9		
6	1	2.3	10.0-10.9	1	2.3
5	4	9.3	9.0- 9.9	1	2.3
4	4	9.3	8.0- 8.9	1	2.3
3	10	23.3	7.0- 7.9		
2	9	20.9	6.0- 6.9	1	2.3
1	4	9.3	5.0- 5.9	2	4.7
0	11	25.6	4.0- 4.9	3	7.0
			3.0- 3.9	1	2.3
			2.0- 2.9	4	9.3
			1.0- 1.9	11	25.6
			0.0- 0.9	15	34.9
Mean	2.2			2.9	
S.D.	1.72			4.03	

Tables VA and VB show the distribution of schools, both with and without resident coordinators, in terms of the two indices of innovativeness. It is observed that, on both indices, schools without resident coordinators had lower means than had schools with resident coordinators. In terms of Index I_1, 45.4 per cent of the schools without resident coordinators had only zero or one innovation compared with an Index I_1, of zero for schools with resident coordinators.

TABLE VA

FREQUENCY DISTRIBUTION OF SCHOOLS WITH AND WITHOUT A RESIDENT COORDINATOR BY THE NUMBER OF DIFFERENT INNOVATIONS

I_1	Schools with (N=10)		Schools without (N=33)	
	f	Per cent	f	Per cent
11				
10				
9				
8				
7				
6	1	10.0	2	6.1
5	2	20.0	3	9.1
4	1	10.0	6	18.2
3	4	40.0	7	21.2
2	2	2.0	4	12.1
1	0	0.0	11	33.3
0	0	0.0		
Mean	3.6		1.7	
S.D.	3.75		2.09	

On Index I_2, extent of innovativeness (Table VB), 69.8 per cent of the schools without resident coordinators compared with 30 per cent of the other schools ranked between 0.0 and 1.9. It remains to be determined whether there is a significant relationship between the presence of a resident coordinator and innovativeness.

TABLE VB

FREQUENCY DISTRIBUTION OF SCHOOLS WITH AND WITHOUT A RESIDENT COORDINATOR BY THE EXTENT OF INNOVATIVENESS

I_2	Schools with (N=10)		Schools without (N=33)	
	f	Per cent	f	Per cent
15.0-15.9	1	10	1	3.0
14.0-14.9				
13.0-13.9				
12.0-12.9	1	10		
11.0-11.9				
10.0-10.9			1	3.0
9.0- 9.9			1	3.0
8.0- 8.9	1	10		
7.0- 7.9				
6.0- 6.9			1	3.0
5.0- 5.9	1	10	1	3.0
4.0- 4.9	1	10	2	6.1
3.0- 3.9			1	3.0
2.0- 2.9	2	20	2	6.1
1.0- 1.9	2	20	9	27.3
0.0- 0.9	1	10	14	42.5
Mean	5.5		2.6	
S.D.	4.80		3.30	

For descriptive purposes Tables VA and VB have presented the innovativeness characteristics of 43 schools. However, for the purposes of examining the relationships between innovativeness and the presence of a resident coordinator (Null Hypotheses 2A and 2B) and for measuring and examining the innovativeness of coordinators (Null Hypotheses 3A, 3B, 3C, and 3D) the five schools with assistant principals who had been science coordinators were removed from the population. Thus the population for testing the above mentioned hypotheses was

thirty-eight. On Index I_1 these five schools had a mean of 4.20 different innovations compared with a mean of 1.92 different innovations for the other thirty-eight schools. On Index I_2 the five schools had a mean extent of innovativeness of 5.55 compared with a mean of 2.37 for the other schools. Thus it was felt that the effect of the assistant principals on innovativeness would obscure the effect of the coordinator.

The Science Teachers and Coordinators

In this section science teachers and coordinators will be considered together since coordinators are primarily science teachers in a particular school and secondarily are science coordinators for the schools in their zones. The data unique to coordinators will be discussed separately.

Table VI shows that all the coordinators and 83.8 per cent of the science teachers are male.

TABLE VI

DISTRIBUTION OF SCIENCE TEACHERS AND COORDINATORS BY SEX

	Science Teachers		Coordinators		Teachers of Science	
	Number	Per cent	Number	Per cent	Number	Per cent
Male	113	83.8	10	100.0	123	84.8
Female	22	16.2	0	0	22	15.2
Total	135	100.0	10	100.0	145	100.0

Most science teachers and coordinators, 78.7 per cent, were under forty years old. As Table VII points out, the mean age for coordinators is 33.5 years with a standard deviation of 8.05 and for science teachers is 32.2 years with a standard deviation of 10.95. The main reason for the wide difference in standard deviations is that, under the definition of <u>science teacher</u>, some older teachers, who taught only one science class, were included in the population. The mean age, 33.7 years, of the total group is almost identical to that of the coordinators. Thus the few individuals at the upper range do not militate against the general youthfulness of the population.

TABLE VII

FREQUENCY DISTRIBUTION OF SCIENCE TEACHERS AND COORDINATORS BY AGE

Age in Years	Science Teachers (N=135)		Coordinators (N=10)		Teachers of Science (N=145)	
	f	Per cent	f	Per cent	f	Per cent
65-69-	1	.7			1	.7
60-64	5	3.7			5	3.4
55-59	3	2.2			3	2.0
50-54	5	3.7			5	3.4
45-49	6	4.5	1	10.0	7	4.8
40-44	7	5.2	3	30.0	10	6.9
35-39	13	9.7			13	9.0
30-34	18	13.3			18	12.4
25-29	45	33.3	6	40.0	51	35.2
20-24	32	23.7			32	22.1
Mean	32.2		33.5		33.7	
S.D.	10.95		8.05		12.90	

This youthfulness is also reflected in the small amount of experience of the teachers and the concentration of that experience in grades seven to nine science teaching (see Appendix EI). Of the science teachers 85.7 per cent have under ten years of junior high school science teaching experience, 60.8 per cent have less than five years, and 77.8 per cent had ten years of total science teaching experience at any level. Thus, most science teachers have received all of their experience at the junior high school level, and are "new" teachers. Coordinators generally mirror this pattern except that they tend to have slightly more science teaching experience. Eighty per cent have under ten years of science teaching experience in junior high school and 40 per cent have less than four years experience at this level. Among the combined populations, 78 per cent had under ten years of total science teaching experience while 84.8 per cent had under ten years at the junior high school level. It can be concluded that most of the teachers of science in this study have had little or no science teaching experience outside the junior high school situation.

In terms of the amount of post-secondary school training of teachers of science in both the field of education and other areas, Appendix E2 shows two major patterns. Fifty-nine per cent of the combined population had no training in other fields while 52.4 per cent had four to six

years training. On the other hand, 22.1 per cent had three to four years training in other fields, while 22.8 per cent had zero to one year of training in education. This grouping is noted also when science coordinators and science teachers are examined separately. It seems that most teachers received all of their post-secondary school training in Education. A smaller group of teachers received theirs in some other field and took one year of training in Education. However, the overall level of amount of training is quite great. Nearly eighty per cent (79.3 per cent) of the teachers have from four to seven years of post-secondary school training.

The population of teachers of science is thus seen to be predominantly male (84.8 per cent), quite young (mean age was 33.7), just beginning a career in science education (mean years of experience was 5.6) and highly trained (mean years of training was 4.3 years).

The Science Coordinator

The junior high schools in the Edmonton Public School District have been organized into ten zones each with several subject-area coordinators. Four zones have five schools each and six zones have four schools each. Thus the number of schools for which a coordinator is responsible is either four or five, including the school in which he is resident as a science teacher.

The role of the science coordinator has been discussed previously (*cf. ante* Chapter II and Chapter III). For this study three dimensions have been isolated, namely job performance, job satisfaction, and effectiveness as an opinion-leader.

In terms of job performance, coordinators spent an average of 1.8 days per week occupied with coordinators' duties (see Table VIII). This accords with the 1.5 days per week allotted to them at the suggestion of central office authorities.

TABLE VIII

FREQUENCY DISTRIBUTION OF THE TOTAL TIME PER WEEK SPENT BY COORDINATORS IN THEIR ROLE AS COORDINATOR

Days/Week	f	Per Cent
2.0 - 2.4		
1.5 - 1.9	4	40.0
1.0 - 1.4	6	60.0
0.5 - 0.9		
Mean	1.8 days/week	

Table IX indicates that coordinators spent an average of one day per month visiting the schools in which they were not resident. This is approximately 12.5 per cent or one-eighth of their allotted time. This low figure seems to be inversely related to the large number of *spoiled returns* on the LBDQ from science teachers in schools without resident coordinators, and from the

various areas of coordinator-expressed dissatisfaction (cf. post).

TABLE IX

FREQUENCY DISTRIBUTION OF THE NUMBERS OF DAYS PER MONTH SPENT BY COORDINATORS IN VISITING SCHOOLS

Days per Month	f	Per Cent
6		
5		
4		
3		
2	4	40.0
1	2	20.0
Less than 1	4	40.0
Mean	1 day per Month	

As shown in Table X, each coordinator had an average total of nine meetings per month, distributed between three meetings with science teachers in his residence school, one with other science teachers in his zone, and five with central office staff, university staff and others. If each meeting occupied one-half teaching day, fifty per cent of the coordinator's time would be spent attending meetings. Slightly more than half the meetings were held with persons other than teachers. Fifty per cent of the coordinators had no meetings per month with teachers in schools other than their own.

TABLE X

FREQUENCY DISTRIBUTION OF THE NUMBERS OF MEETINGS PER MONTH ATTENDED BY COORDINATORS

Meetings/ Month	With Teachers				With Others		Total Meetings	
	In own School		In other Schools					
	f	Per cent	f	Per cent	f	Per cent	f	Per cent
16 or more								
13 - 15	1	10.0					1	3.3
10 - 12								
7 - 9					3	30.0	3	10.0
4 - 6					4	40.0	4	13.3
1 - 3	8	80.0	5	50.0	3	30.0	16	53.4
Less than 1	1	10.0	5	50.0			6	20.0
Mean	3 meetings/ month		1 meeting/ month		5 meetings/ month		9 meetings /month	

In terms of job satisfaction, coordinators were asked to state a perceived degree of self-satisfaction, in each of their major task areas, on a six point scale extending from <u>very satisfied</u> to <u>very dissatisfied</u>. Table XI shows that they were generally satisfied with developing cooperative teaching in their own school but were dissatisfied with their performance on this task in other schools. They felt a high degree of satisfaction in the implementation of pilot projects both, in their own and in other schools. They were also generally satisfied with their performance in assisting teachers, working on special projects and developing materials. For each task

TABLE XI

FREQUENCY DISTRIBUTION OF COORDINATORS BY THE DEGREE OF SATISFACTION FELT IN PERFORMING CERTAIN DUTIES

Degrees of Satisfaction	Developing Cooperative Teaching		Implementing Pilot Projects		Assisting Teachers		Assisting in Developing Special Materials		Total Activities		
	Own Sch.	Other Sch.	Own Sch.	Other Sch.	Own Sch.	Other Sch.	Own Sch.	Other Sch.	Own	Others	Over all
	f	f	f	f	f	f	f	f	f	f	f
6	1	0	5	0	2	2	1	4	8	2	15
5	3	1	3	5	6	1	5	4	12	7	28
4	2	1	1	2	2	5	3	2	5	8	18
3	2	3	0	3	0	1	0	0	2	7	9
2	2	5	1	0	0	1	1	0	3	6	10
1	0	0	0	0	0	0	0	0	0	0	0
Mean	3.40	2.80	5.10	4.20	5.00	4.20	4.5	5.2	4.6	3.1	4.4
S.D.	.90	.60	.78	.87	.63	.91	.64	.74	1.21	1.22	.91

the range of opinion between coordinators was not great. Overall, the coordinators tended to be satisfied more with their performance in their own schools than with their performance in other schools. The <u>slight</u> amount of dissatisfaction felt by the coordinators in the latter instance is difficult to reconcile with the high proportion of teachers who exhibited little knowledge of their coordinator and with the low frequency of meetings between coordinators and these teachers.

Several other dimensions were also examined briefly (see Appendix F). The science coordinators felt, almost unanimously, that they had encountered little opposition from both administrative personnel and teachers. The single science coordinator who did perceive opposition was different in each dimension. Ninety per cent felt that the financial remuneration was inadequate. However they were divided as to whether the allotted day and a half per week was adequate. Nearly all, 80 per cent, felt that they had sufficient authority to perform their duties.

The innovativeness of the coordinators was described by using the two stated indices of innovativeness. A value for each coordinator was obtained from each index by taking the means of each index for each school for which a coordinator was responsible and which had an assistant principal who had not been a science coordinator. As Table

XII shows, the coordinators had an average of 1.9 different innovations on Index I_1 with a standard deviation of .81. On Index I_2, the group had an average of 2.5 with a standard deviation of 1.79. There is thus greater variability among science coordinators in terms of the extent of innovativeness among the schools for which they are responsible than in terms of the number of different innovations in the same schools.

TABLE XII

DISTRIBUTION OF SCIENCE COORDINATORS BY NUMBER OF DIFFERENT INNOVATIONS AND EXTENT OF INNOVATIVENESS RANKED ACCORDING TO INDEX I_1

Coordinator Rank	Order of I_1	I_2
A	3.2	2.98
B	2.5	4.75
C	2.5	2.17
D	2.2	4.35
E	2.2	1.51
F	2.0	2.37
G	2.0	.95
H	1.7	5.22
I	.7	.45
J	.5	.25
Mean	1.9	2.5
S.D.	.81	1.79

When used for the purpose of describing the coordinators, Index I_1 and Index I_2 had a correlation of .47 which is significant at the .01 level. A comparison between this correlation and the previous correlation of

.67 between the same indices, when they were used to describe the schools, seems to suggest that the indices predict different things even though Index I_2 contains Index I_1. This is exemplified in Table XII by the case of coordinator "H" whose indices of $I_1 = 1.7$ and $I_2 = 5.22$ were the averages of the indices of three schools. One of his schools had four science teachers, one who was not innovating, one who was innovating three times and two who were innovating twice. The school's Index I_1 was 3 while its Index I_2 was 15.25 (highly innovative).

The coordinator's characteristics as a leader of a group were measured by the LBDQ. Table XIII shows that on all dimensions except Tolerance of Freedom the coordinator ranks lower than school principals, ministers and community leaders, but approximates, more closely, the role of the principal. All groups rate low on Production Emphasis, Tolerance of Uncertainty and Integration, and higher on Consideration and Representation. Ministers and Community Leaders also are high on Predictive Accuracy while principals are high on Representation. Coordinators tend to be low on those dimensions associated with the more formal, legal-rational aspects of an organization, namely Production Emphasis, Integration, Initiation of Structure and Persuasion. They are highest on Tolerance of Freedom, Consideration, Demand Reconciliation and Superior Orientation, dimensions associated more with the informal, non-rational

TABLE XIII

COMPARATIVE LBDQ MEAN SCORES AND STANDARD DEVIATIONS OF SCIENCE COORDINATORS AND SELECTED GROUPS

Subtests	Coordinators		Alberta School Principals		Ministers		Community Leaders	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Representation	36.6	1.3	39.0	--	40.8	2.4	39.2	2.4
Demand Reconciliation	36.8	.6	38.8	--	37.6	3.1	39.4	3.3
Tolerance & Uncertainty	35.6	1.4	36.8	--	37.5	6.3	37.7	5.6
Persuasion	34.8	1.6	35.8	--	42.7	4.7	39.5	5.5
Initiation & Structure	33.3	1.6	37.9	--	38.7	4.9	37.2	5.7
Tolerance of Freedom	39.6	1.4	38.6	--	37.5	6.0	36.4	5.0
Role Assumption	35.7	1.7	38.6	--	41.5	5.4	39.8	5.6
Consideration	37.9	1.5	38.7	--	42.5	5.8	41.1	4.7
Production Emphasis	29.4	1.5	31.2	--	34.9	5.1	35.4	6.8
Predictive Accuracy	34.6	.7	36.0	--	41.0	4.6	39.5	4.9
Integration	32.6	.9	36.0	--	--	--		
Superior Orientation	36.5	2.2	37.0	--	--	--		

aspects of an organization. Considering that 115 respondents evaluated the coordinators, there is less variability among the replies on Demand Reconciliation, Integration and Predictive Accuracy than on the other dimensions. Finally, ministers and community leaders were selected because their assumed leadership was felt to be more closely associated with the informal dimensions of inter-personal relations than with the more formal dimensions.

In terms of opinion-leadership scores, Table XIV shows that 60 per cent of the coordinators scored the maximum of six points while one coordinator scored three points. The mean was 5.4 points and the distribution with a S.D. of .91 showed little variability. However, the small total population (N=10) possibly contributed to the heavily skewed distribution.

TABLE XIV

FREQUENCY DISTRIBUTION OF SCIENCE COORDINATORS ON SELF-DESIGNATING OPINION-LEADERSHIP SCORES

Scores	f (N=10)	Per Cent
6	6	60.0
5	3	30.0
4	0	
3	1	10.0
2	0	
1	0	
Mean	5.4	
S.D.	.91	

V. STATISTICAL TREATMENT

The data obtained from the SCQ and the TCQ concerning innovativeness, from the OCDQ concerning climate, and from the LBDQ and Opinion Leader Questionnaires concerning the coordinator, was treated statistically in order to study the problems and hypotheses presented in Chapter III. Table XV is a summary of the hypotheses in terms of the variables and populations.

All the hypotheses were tested to produce correlation coefficients, squared-multiple correlations, and "t" and "F" values. Since hypotheses 1, 3, and 5 each compared two continuous variables Pearson product-moment correlations and "t" tests were used to establish the degree of the direction and the significance and degree of predictability of the relationships. The use of the product-moment correlation assumes that the linear-regression model will fit the data and that the variation around this line is equal (DuBois, 1965). Thus normality need not be assumed. In fact Hays (1963) has stated that:

> ... It is not necessary to make any assumptions at all about the form of the distribution, the variability of the Y scores within X columns or "arrays", or the true level of measurement represented by the scores in order to apply linear regression and correlation indices to describe a given set of data. So long as there are N distinct cases, each having two numerical scores, X and Y, then the descriptive statistics of correlation and regression may be used. In doing so we describe the data as though a linear rule

TABLE XV

SUMMARY OF NULL HYPOTHESES IN TERMS OF VARIABLES AND POPULATION SIZE

Null Hypotheses	Dependent Variable	Independent Variable	N
Major Hypotheses			
1A	Numbers of Innovations (I_1)	Global Climate	43
1B	Extent of Innovativeness (I_2)	"	43
1C	Numbers of Innovations (I_1)	Eight Climate Subtests	43
1D	Extent of Innovativeness (I_2)	"	43
2A	Numbers of Innovations (I_1)	Presence of a Resident Coordinator	38
2B	Extent of Innovativeness (I_2)	"	38
(Note: Five schools containing assistant principals who were coordinators, were removed.)			
3A	Number of Innovations (I_1)	Coordinator's Opinion-Leader Scores	10
3B	Extent of Innovativeness (I_2)	"	10
3C	Number of Innovations (I_1)	Coordinators 12 LBDQ Scores	10
3D	Extent of Innovations (I_2)	"	10
Minor Hypotheses			
4A	Global Climate	Presence of a Resident Coordinator	43
4B	Eight Climate Subtests	"	43
5	Coordinators' Opinion-Leader Scores	Coordinator's 12 LBDQ Scores	10

> were to be used for prediction, and this is a perfectly adequate way to talk about the tendency of these numerical scores to associate or "go together" in a linear way.

Since hypotheses II and IV each compared continuous dependent variables, with a categorical independent variable, point biserial coefficients of correlation were obtained. It was found convenient to test the significance of these hypotheses using an "F" test, though this was not essential since only two variables were being tested in each case. To obtain the "F" and point biserial "r" values the following model was used (Flathman, 1968):

$$Y = A_o + A_1 X_1 + A_2 X_2 \ldots A_k X_k + E$$

where Y is the dependent variable, A_o is a constant for all subjects, $A_1 - A_k$ are regression weights, X is the independent variable and E is the error. The method used to determine the As is to require that the weights chosen produce the minimum sum of squares of the error terms. This occurs when the predicted scores for each category are equal to the observed mean criterion scores for that category. The criterion means are therefore:

$$P_1 = A_o + A_1$$

$$P_2 = A_o + A_2$$

.

.

.

$$P_k = A_o + A_k$$

where A_o can be any value and $A_1 \ldots A_k$ are the mean criterion scores of the respective categories.

To test an hypothesis which states that there are no differences between the categories of the independent variable in terms of the dependent variable it is stated that:

$$A_o + A_1 = A_o + A_2 = A_o + A_3 = A_o + A_k \quad \text{or}$$

$$A_1 = A_2 = A_3 = A_k = A$$

where $A = G - A_o$ and where G is a weight, the grand mean of the criterion scores. The full model is then restricted by substituting the above limitations to produce the <u>restricted</u> <u>model</u> (Model 99).

$$Y = GU + E$$

where $U = X_1 + X_2 + X_3 \ldots X_k$

This model represents the zero point of information. Thus the degree to which the predictability of the dependent variable differs from zero is a ratio, shown by:

$$F = \frac{(R^2_1 - R^2_{99}) / (df_1 - df_{99})}{(1 - R^2_1) / (N - df_1)}$$

where R^2_1 + R^2_{99} are the squared multiple correlations arising from the full model and restricted models respectively. It has already been implied the R^2_{99} always equals zero.

VI. SUMMARY

In summarizing Chapter IV the following observations can be made:

(1) Most schools had fewer than seven science teachers. Thus the climate as perceived by science teachers and reported in this study may not be congruent with the total climate of the same school as perceived by the total teaching staff.

(2) Most schools had either Open, Closed or Familiar Climates. Schools with resident coordinators contributed most to the number of schools with Familiar climates.

(3) The schools were generally low on both indices of innovativeness and showed greater variability in the extent of their innovativeness than in their number of innovations.

(4) There appears to be a direct relationship between the values of indices of innovativeness and the presence of a resident coordinator.

(5) Most science teachers and coordinators were male, under thirty-five years old, had less than five years of teaching experience (all in junior high school science) and had four years of post-secondary training in education.

(6) Coordinators spent slightly more than the allotted time performing coordinator duties. Most time was spent attending meetings with people other than teachers.

Part of their time was spent working with teachers in the coordinators' residence schools. One-eighth was spent with teachers in other schools in the coordinators' zones. Half the coordinators had no monthly meetings with this latter group of teachers.

(7) Coordinators were generally more satisfied with their work in their own school than with their work in other schools. They were most satisfied with their work in implementing pilot projects and least satisfied with their development of cooperative teaching situations. There was little variability between coordinators in terms of innovativeness. They perceived themselves to be effective opinion-leaders and rated highest on those LBDQ dimensions associated with Consideration and Tolerance of Freedom. The amount of authority they had was perceived to be sufficient.

(8) While there was a high correlation between the indices of innovativeness, each index appears to measure different things. In other words, there is no interaction between the two indices other than what has been permitted.

CHAPTER V

RESULTS -- ANALYSIS AND DISCUSSION

The previous chapter presented a description of the schools, the science teachers and the coordinators, the statistical methods used to test the hypotheses and a summary of the hypotheses which were previously presented in Chapter III. The present chapter presents the results of testing each of the thirteen hypotheses and an analysis and discussion of each. The hypotheses will be grouped and examined under each of the five problems. The level of confidence reported for each hypothesis will be the lowest level (.2, .1, .05 or .01) at which the significance of the hypotheses is observed.

I. INNOVATIVENESS AND CLIMATE

Problem One

"Is there a relationship between innovativeness and organizational climate?"

Analysis. Null hypothesis IA predicted that there would be found no significant relationship between the number of different science programs considered as innovations (I_1) and the global climate of a school. As Table XVI shows, global climate and Index I_1 correlated negatively with a value of -.253 which is significant at the .1 level of confidence for a two-tailed test. The squared correlation,

TABLE XVI

CORRELATION COEFFICIENTS BETWEEN INDICES OF INNOVATIVENESS AND GLOBAL CLIMATES

Variable	I_1			I_2		
	r	R^2x100	"t"	r	R^2x100	"t"
Index I_1	.000	.000	0.00	.672[a]	46.16	5.82[a]
Global Climate (Open-Closed 1-6)	-.253[c]	6.25	-1.67[c]	-.302[b]	9.00	-2.03[b]

[a]Significant at .01 level for a two-tailed test.
[b]Significant at .05 level for a two-tailed test.
[c]Significant at .1 level for a two-tailed test.

expressed as a percentage, was 6.25. Thus, at the .1 level, there is a positive significant relationship between the openness of a climate and the number of science programs considered as innovations in junior high schools. In addition, 6.25 per cent of Index I_1 can be predicted by climate.

Null hypothesis IB predicted that there would be no significant relationship between global climate and the extent of innovativeness (I_2). Climate again correlates negatively with this index, with a value of -.302 which is significant at the .05 level and is presented in Table XVI. The squared correlation was 9.0 per cent. Thus, at the .05 level of confidence, there is a positive significant relationship between the extent to which innovation is

occurring and the degree of openness of climate. Also, 9.00 per cent of the extent of innovativeness can be predicted by the climate.

Null hypotheses IC and ID predicted that there is no significant relationship between I_1 and I_2 respectively and each of the eight subtests of climate. As Table XVIA indicates, Index I_1 correlated positively with Consideration with a value of .299 at the .05 level and negatively with Aloofness with a value of -.392 at the .01 level. Consideration is able to predict 8.41 per cent of Index I_1 and Aloofness 15.21 per cent of the same index. The null hypothesis was rejected for these two subtests but was accepted for the other six subtests. However, on four subtests, namely Esprit, Intimacy, Aloofness and Consideration, the null hypothesis of no significant relationship with I_2 was rejected. Index I_2 correlated positively and significantly with Consideration with a value of .321 at the .05 level, with Intimacy positively and significantly with a value of .296 at the .05 level; with Esprit positively and significantly with a value of .268 at the .1 level; and with Aloofness negatively and significantly with a value of -.432 at the .01 level. Index I_2 was shown to be 18.49 per cent predictable by Aloofness, 10.24 per cent predictable by Consideration, 8.41 per cent predictable by Intimacy and 6.76 per cent predictable by Esprit.

TABLE XVIA

CORRELATION COEFFICIENTS BETWEEN INDICES OF INNOVATIVENESS AND CLIMATE SUBTESTS

Climate Variables	I_1			I_2		
	r	R^2x100	"t"	r	R^2x100	"t"
Disengagement	-.105	1.00	-.67	.013	.01	.08
Hindrance	.049	.25	.32	.097	.81	.62
Esprit	.188	3.24	1.23	.268[c]	6.76	1.78[c]
Intimacy	.188	3.24	1.22	.296[b]	8.41	1.98[b]
Aloofness	-.392[a]	15.21	-2.72[a]	-.432[a]	18.49	-3.06[c]
Production Emphasis	-.122	1.44	-.78	-.227	4.84	-1.49
Thrust	.133	1.69	.89	.155	2.25	1.00
Consideration	.299[b]	8.41	2.00[b]	.321[b]	10.24	2.17[b]

[a]Significant at .01 level for a two-tailed test.
[b]Significant at .05 level for a two-tailed test.
[c]Significant at .1 level for a two-tailed test.

Discussion. Null hypotheses IA and IB were substantiated, only at the .1 level of confidence when Index I_1 was used but at the .05 level of confidence when Index I_2 was used. Though the predictability in each case was low, trends indicated that climate, as measured by the OCDQ, could predict innovativeness.

It was reported (_cf._ _ante_ Chapter III) that _Open_ climate schools tend to have high _Esprit_, _Thrust_ and _Consideration_ and low _Disengagement_, _Hindrance_, _Aloofness_ and _Production Emphasis_. _Closed_ climate schools show the opposite trends on these dimensions. Both indices correlated both with the expected direction and, to some extent, expected degree of each of these dimensions just listed. It is not surprising that _Consideration_ and _Aloofness_ showed the highest degree of significant correlation with each of the indices since 11.6 per cent of the schools had a _Familiar_ climate in which _Consideration_ is high and _Aloofness_ is low. Both dimensions are perceived dichotomous qualities of the principal and are more closely related to interpersonal relationships of the informal organization than to the legal-traditional relationships of the formal organization. This finding seems to substantiate Carlson's opinion (_cf._ _ante_) that warm interpersonal relationships are essential ingredients in the process of innovation.

The results of testing these hypotheses also indicate

important differences between the two indices of innovativeness. Though the correlation (.672 which is significant at the .01 level) between the two is high, Index I_2 seems to be more sensitive than Index I_1. The former correlated significantly with four subtests while the latter with only two. Both correlated with Aloofness and Consideration at the same levels. However, Esprit, which the literature suggests is the best single indication of climate, correlated significantly with only Index I_2. A possible reason for the greater sensitivity of Index I_2 lies in the fact that of the three variables included in Index I_2, namely Index I_1, number of science teachers and the sum of the teachers scores' on innovativeness, the first two exercise only a control function and therefore tend to emphasize the importance of the individual teacher in the adoption process. This emphasis on the individual possibly explains the high degree of correlation with subtests related to consideration and warmth and thus highlights those dimensions of climate which determine innovativeness. This finding with respect to consideration and warmth is further substantiation for the definition of climate used in this study, for the theoretical emphasis on perceived role and role expectations and for the assumption of the prime importance of the individual in the adoption process.

II. INNOVATIONS AND THE RESIDENCY OF THE COORDINATOR

Problem Two

"Is there a relationship between innovativeness and the presence of a resident coordinator?"

Analysis. Null hypotheses IIA and IIB suggested that no significant relationships would be found between either index of innovativeness and the presence or absence of a science coordinator as a resident science teacher in a school. To control for the possible influence on innovativeness of an assistant principal who was previously a science coordinator, the five schools containing such assistant principals were removed from the sample leaving a population of thirty-eight schools. Of these, ten schools (26.3 per cent) had resident coordinators while twenty-eight (73.7 per cent) had no resident coordinator. As Table XVII points out both indices correlated positively and significantly with the presence of a resident coordinator. The correlation between two groups of schools on Index I_1 was .622 which is significant at the .01 level with 38.75 per cent of I_1 being predictable by the residency of the coordinator. The correlation, between schools on Index I_2 was .516 which is significant at the .01 level with 26.65 per cent of I_2 being predictable. In both cases degrees of freedom in the numerator and denominator for a one-

tailed test for significance were 1 and 36 respectively.

TABLE XVII

CORRELATION COEFFICIENTS BETWEEN SCHOOLS WITH AND WITHOUT SCIENCE COORDINATORS RESIDENT AS SCIENCE TEACHERS ON TWO INDICES OF INNOVATIVENESS AS DEPENDENT VARIABLES

Innovation Variables	Correlations (N=38)			Means	
	r_{pb}	R^2x100	"F"	Schools With (N=10)	Schools Without (N=28)
Number of Innovations (Index I_1)	.622[a]	38.73	22.76[a]	3.60	1.32
Extent of Innovativeness (Index I_2)	.516[a]	26.65	13.08[a]	5.34	1.30

[a]Significant at .01 level with one-tailed test.

Discussion. As was expected, the null hypotheses stating that there was no significant relationship between the amount of innovativeness and the presence of a resident coordinator, and that there was no significant difference between the mean values of each of Index I_1 and Index I_2 in schools with and without resident coordinators, was conclusively rejected. Since the innovations used were pilot projects, this finding is in accord with the previously discussed high degree of satisfaction felt by the coordinators in implementing pilot projects. Not surprisingly, the correlation and predictability of Index I_1 was greater than

the correlation and predictability of Index I_2. We have noted that Index I_2 emphasized the personal innovativeness of teachers. This seems to be related to the observation that the duties of the coordinator which demanded close interpersonal relationships were those with which the coordinators felt a low degree of satisfaction (*cf.* *ante* Chapter IV). Finally, the findings suggest that the coordinator may be responsible for the implementation of 38.73 per cent of Index I_1, i.e. four out of eleven pilot projects.

III. INNOVATIONS AND COORDINATOR CHARACTERISTICS

Problem Three

> "Is there a relationship between innovativeness and certain leadership characteristics of a coordinator?"

Analysis. Null hypotheses IIIA, IIIB, IIIC and IIID suggested that no significant relationships would be found between either of the two indices of innovativeness and the coordinators' scores on both an opinion-leader questionnaire and a leadership behavior description questionnaire. Table XVIII contains the data related to these four hypotheses.

The correlations between the opinion-leader score and each of Index I_1 and Index I_2 are .177 and -.202 respectively, which are not significant. Nor does an

TABLE XVIII

CORRELATION COEFFICIENTS BETWEEN INDEX I AND COORDINATORS' OPINION-LEADERSHIP SCORES AND LBDQ SUBTEST SCORES

Tests and Subtests	Index I_1 (N=10)			Index I_2 (N=10)		
	r	R^2x100	"t"	r	R^2x100	"t"
Opinion Leader Score	.177	2.89	.51	-.202	2.00	-.58
1. Representation	.667[b]	43.56	2.53[b]	.154	2.25	.44
2. Demand Reconciliation	-.022	.04	.06	-.540[c]	29.16	-1.81[c]
3. Tolerance of Uncertainty	-.078	.49	.22	-.364	12.96	-1.10
4. Persuasiveness	.380	14.44	1.16	-.228	4.84	- .66
5. Initiation of Structure	.408	16.00	1.26	-.157	2.25	- .45
6. Tolerance of Freedom	.756[a]	56.25	3.27[a]	.445[d]	19.36	1.40[d]
7. Role Assumption	.41[d]	16.81	1.27	.088	.64	.25
8. Consideration	.488[d]	23.04	1.58[d]	-.024	.04	- .06
9. Production Emphasis	.362	12.96	1.10	-.023	.04	- .06
10. Predictive Accuracy	.122	1.44	.34	-.357	12.25	-1.08
11. Integration	.503[d]	25.00	1.64[d]	-.045	.16	- .12
12. Superior Orientation	.547[c]	29.16	1.85[c]	-.050	.25	- .14

[a]Significant at .01 level with a one-tailed test.
[b]Significant at .05 level with a one-tailed test.
[c]Significant at .1 level with a one-tailed test.
[d]Significant at .2 level with a one-tailed test.

opinion-leader score predict much of either index of innovativeness. Thus one must accept the null hypothesis and conclude that an intuitively-derived strong positive relationship between a coordinator's perception of himself as an opinion-leader and the actual innovativeness in schools for which he is responsible does not exist.

The correlations between the LBDQ subtests and the indices generally were not significant. However Index I_1 was positively correlated with Representation with a value of .667, significant at the .05 level, and was 43.56 per cent predictable by this index. The same index Tolerance of Freedom was even more highly positively correlated with a value of .756, significant at the .01 level, and was 56.25 per cent predicatable from Index I_1. The correlation between Index I_1 and Superior Orientation was lower with a value of .54, significant at the .1 level, and with only 29.16 per cent of the subtest being predictable. Index I_1 showed trends towards significant correlation at the .1 level with both Consideration and Integration but the correlations were inconclusive.

Correlations between Index I_2 and the subtests were even fewer. There was a significant negative correlation with Demand Reconciliation at the .1 level and a tendency towards a positive correlation with Tolerance of Freedom. The degree of predictability of I_2 by each subtest was slight.

Discussion. It must be stressed that the general lack of significant relationships demonstrated in testing these hypotheses may be due to the very small population. However, it is argued that since this is the total population of science coordinators the current situation in the Edmonton junior high schools is described, even though predictability is lost.

Concerning the first two hypotheses, one must conclude:

(1) that the Self-Designating Opinion-Leadership Scale is unable to categorize individuals. This is not consistent with the results reported by Rogers (1962) and Marion (1967) who found that the instrument could categorize individuals.

(2) that the accuracy of the self-perception of coordinators is in doubt, and/or,

(3) that the coordinators are only in part responsible for the numbers of innovations in science programs and can claim even less responsibility for the extent to which science teachers are innovating. Neither index of innovativeness correlated significantly with opinion-leadership scores.

Concerning the last two hypotheses, it has been observed (cf. ante Chapter IV) that science teachers, other than those in a coordinator's residence school, were not well acquainted with him, and thus their assessment of him through the LBDQ subtests must be treated cautiously. In

terms of Index I_1, the number of different pilot projects, it is observed that the coordinator both allows science teachers scope for independent action and is perceived as being a spokesman for the science teachers. However, it can also be argued that he is speaking more for the pilot projects than for the science teachers. This latter interpretation appears to be substantiated by the few inconclusive correlations established between the subtests and Index I_2, the extent of innovativeness. It has been observed that this index focuses sharply upon the activity of the individual science teachers, that science teachers are little acquainted with the science coordinators, and that the coordinators feel the greatest amount of dissatisfaction in those activities relying heavily upon open interpersonal relationships. With the notable exception of Tolerance of Freedom, most of the subtests show a slight negative correlation with Index I_2. The implications of the above observations and the negative correlations seem to be: (1) that the coordinator has no positive influence on science teachers and, (2) that science teachers, being unaware of his official role, perceive his leadership to be prejudicial to their actions in innovating.

Finally, it is observed that the findings of these hypotheses are based upon science teacher perceptions regardless of whether the respondent teacher is in a school with or without a resident coordinator. Since 77 per cent

of the schools have no resident coordinator, the teachers' perceptions of the leadership qualities of the coordinators will be most influenced by teachers in these schools.

IV. CLIMATE AND THE RESIDENCY OF THE COORDINATOR

Problem Four

"Is there a relationship between organizational climate and the presence of a resident coordinator?"

Analysis. Null hypotheses IVA and IVB suggested that no significant relationships would be found between climate and climate subtests and the presence or absence of a resident science coordinator. This is another way of suggesting that the differences between means of the two groups of schools on climate measures do not significantly differ from no, or zero, difference between the respective means. The population of forty-three schools was tested with ten schools in one group and thirty-three in the other. Since two variables were used for each of nine tests for significance, the degree of freedom for the numerator of the "F" ratio was one and for the denominator, forty-one. As Table XIX shows, no significant correlation appeared between the global climates of the two groups therefore null hypothesis IVA was accepted.

Among the eight subtests Intimacy and Aloofness were observed to correlate with the presence of a resident coordinator. The correlation coefficient for Intimacy was

.328, which is significant at the .05 level and produces a predictability of 10.77 per cent. One can state that 10 per cent of friendly social relationships between teachers in a school in which a coordinator is resident is perhaps due to the science coordinator. A significant negative correlation of -.263 was found between Aloofness scores for each group and is significant at the .1 level.

TABLE XIX

CORRELATION COEFFICIENTS BETWEEN SCHOOLS WITH AND WITHOUT SCIENCE COORDINATORS RESIDENT AS SCIENCE TEACHERS ON GLOBAL CLIMATE AND CLIMATE SUBTESTS AS DEPENDENT VARIABLES

Climate Variables	Correlations (N=43)		
	r_{pb}	R^2x100	"F"
Global Climate	.087	.64	.31
Disengagement	-.091	.82	.34
Hindrance	.122	1.50	.62
Esprit	.149	.22	.93
Intimacy	.328[b]	10.77	4.95[b]
Aloofness	-.263[c]	6.95	3.06[c]
Production Emphasis	-.219	4.81	2.07
Thrust	-.010	.01	.004
Consideration	.007	.00	.002

[a]Significant at .01 level with one-tailed test.
[b]Significant at .05 level with one-tailed test.
[c]Significant at .1 level with one-tailed test.

There is thus a negative relationship suggested between the degree to which a principal was perceived to be formal and impersonal and placement of a science coordinator. However, the predictability of the degree of Aloofness is, at best,

speculative. As was found in testing null hypotheses IC and ID the _Esprit_ dimension is again not significant. _Consideration_, shown to have some significance in null hypotheses IC and ID also shows no significant or substantial correlation in null hypotheses IVA and IVB. Therefore null hypothesis IVB was accepted for all subtests except _Aloofness_ and _Intimacy_.

Discussion. Theoretically, climate has been defined as a set of relationships between principal, teachers and teachers as a group. It was implied in Chapter II that, if the coordinator's role was significant in terms of interpersonal relationships within a school, a triangular model of role relationships would change to a four-sided model. This has not been demonstrated. Therefore one must conclude that the role of science coordinator does not appreciably affect the school climate.

A relationship between the subtests _Intimacy_ and _Aloofness_ and the presence of a resident coordinator has been demonstrated. However, one cannot define cause and effect relationships because the presence of high _Intimacy_ and low _Aloofness_ may as much be the reason for a particular school being selected for the residence of a coordinator as they are the result of the coordinator's presence.

V. COORDINATORS' LEADERSHIP CHARACTERISTICS

Problem Five

"Is there a relationship between certain role characteristics of a coordinator as they concern innovativeness?"

Analysis. Null hypothesis V suggested that there is no significant correlation between a coordinator's score on a self-administered opinion-leader test and a coordinator's leadership characteristics as described by each of twelve subtests of leadership behaviour. Due to the small total population (N=10) the correlations presented in Table XX must be interpreted cautiously. As previously presented the mean OPL scores was 5.4. Only Tolerance of Uncertainty and Integration correlated at the .1 level with the OPL score with values of .546 and .647 respectively. Representation, Role Assumption, and Consideration correlated at the .2 level with the OPL score with values of .502, .512 and .550 respectively. However, all correlations are positive. Considering the small population the null hypothesis is accepted for all subtests except Tolerance of Uncertainty and Integration. In these last two cases it is rejected with caution. The other three subtests only indicate trends towards rejection of the null hypothesis.

TABLE XX

CORRELATION COEFFICIENTS BETWEEN SELF-DESIGNATING OPINION LEADERSHIP SCORES AND LBDQ SUBTESTS

LBDQ Subtests	Correlations (N=10)		
	r	R^2x100	"t"
1. Representation	.502[d]	25.00	1.64[d]
2. Demand Reconciliation	.221	4.84	.64
3. Tolerance of Uncertainty	.546[c]	29.16	1.84[c]
4. Persuasion	.237	5.29	.69
5. Initiating Structure	.190	3.61	.54
6. Tolerance of Freedom	.095	.81	.27
7. Role Assumption	.512[d]	26.01	1.68[d]
8. Consideration	.550[d]	30.25	1.86[d]
9. Production Emphasis	.080	.64	.22
10. Predictive Accuracy	.261	6.76	.76
11. Integration	.647[c]	40.96	2.40[c]
12. Superior Orientation	.229	4.84	.66

[a]Significant at .01 level for a two-tailed test.
[b]Significant at .05 level for a two-tailed test.
[c]Significant at .1 level for a two-tailed test.
[d]Significant at .2 level for a two-tailed test.

Discussion. It was suggested in Chapter IV "that the subtests of the LBDQ which relate most closely to opinion-leader scores would also be those on which the coordinator is rated highest by his group members." As Table XIII showed, those subtests are: Tolerance of Freedom, Consideration, Demand Reconciliation, Representation and Superior Orientation. Of these only Representation and Consideration showed tendencies to correlate significantly with opinion-leader scores. One must conclude that there is no congruence between a science coordinator's role perception and his role expectations. This has been implied

previously in the discussion of null hypotheses IIIA and IIIB.

It is also observed that there is a slight tendency for a coordinator's leadership to be more active in those areas, namely Representation, Role Assumption and Integration, associated more with the formal than with the informal aspects of organizations. This association with the "formal organization" is also suggested by the analysis of the null hypotheses IIIA and IIIB in Table XVIII which showed that the same or associated formal factors, namely Representation, Integration and Superior Orientation, were operative. In this last regard, it is difficult to interpret the high significance of Tolerance of Freedom in terms of innovativeness and its absence of significance in terms of opinion-leader scores, which suggests that coordinators do not seem to be aware of those dimensions of leadership in which they can operate most effectively.

VI. SUMMARY

This chapter has presented the results of testing five groups of hypotheses. Significant relationships were found between global climate and each of the indices of innovativeness. Both indices were shown to be predictable by Aloofness and Consideration factors. Index I_2 showed greater sensitivity toward all climate aspects than did Index I_1. The components of I_2 were discussed. As was

expected, there is a significant difference between schools with and without resident coordinators in terms of innovativeness, even when the effect of the influence of assistant principals was eliminated. The null hypotheses relating both self-perceived and other-perceived leadership characteristics to innovativeness were accepted. From an analysis of such hypotheses certain incongruencies were observed to be present. No relationships between the residency of the coordinator and the climate were established. Thus the theoretically-suggested positive influence of the role of the coordinator was not substantiated. Finally, few significant relationships were observed to exist between the role perception of the science coordinator and the science teachers' expectations for that role.

CHAPTER VI

SUMMARY, CONCLUSIONS, FURTHER RESEARCH AND IMPLICATIONS

I. SUMMARY

Theoretical Content

In the summary of Chapter II three theoretically-derived suggestions were presented. These were: (1) a mechanistic interpretation of the concept of homeostasis does not adequately explain changes in a healthy organization; (2) organizational climate can be considered as the set of role episodes within a formal organization; (3) the role of the junior high school science coordinator is that of an "opinion-leader" not "a change agent". The first suggestion is derived from concepts contributed jointly by general systems theory and Rogers' theoretical model of the adoption process. The second is derived from Halpin and Croft's definition and measurement of organizational climate and Allport's and Katz and Kahn's model which describes role perceptions and role expectations as a "role episode" or a "cycle of events". The last suggestion is derived from various conceptions of the role of a leader in the innovations process.

General Systems Theory and Innovation. Each junior high school was considered as a discrete system existing

within two supra-systems, namely the Edmonton Public School system and the socio-economic environment of the City of Edmonton. Each school is composed of sub-systems, namely a principal, each science teacher, science teachers as a group, and a science coordinator. These sub-systems function in relationship to each other to form an organizational climate which is the main determiner of the boundary of each system.

It was suggested that each system or school is an open system. Thus each: (1) exchanges matter and energy with its environment to maintain a relatively constant internal environment, (2) is sensitive to environmental changes and demonstrates this sensitivity by its internal changes, one type of which are innovations, (3) demonstrates the concept of equifinality in that the goals of increased scientific literacy and understanding by students through inquiry-process oriented teaching strategies might be achieved through any one or some combination of eleven different science programs, (4) shows progressive differentiation of parts, namely the establishment of the role of science coordinator, in response to environmental changes and pressures.

Essentially then, each system displays the dichotomy of stability and changes which gives rise to tensions, a major condition for the "healthiness" of the system (Miles, 1965). Such a state of tension is not explainable in the

mechanistic terms of traditional models of homeostasis.

Rogers' paradigm of the adoption process (*cf. ante* Chapter II) has given perspective to a system's antecedent condition for change and to the stage at which the innovations have reached in this process. The antecedent conditions have been described as the organizational climate and the functions of the science coordinator. The innovations, pilot projects, have been located at the "trial stage" of the adoption process.

Climate and Role Episode. Organizational climate has been considered as the totality of the role expectations and perceptions existing between a principal, a science teacher and science teachers as a group. It is also that characteristic of an organization which is measured by the OCDQ. Katz and Kahn have suggested that role relationships can be described in terms of cycles of events or activities which result from the reciprocal responses of interacting individuals. Thus role relations are seen as the determiners of climate and as a significant influence on the effectiveness of any role performance. This latter point seems to have been demonstrated by the lack of congruency between: (1) a coordinator's role perception and the role expectations science teachers held for him, and (2) the definition of the science coordinator's role and the effective performance of his role.

Role of an Innovator. The assumption was made that the function of the science coordinator is to implement and assist in "change" processes in science curriculum. The definition of this role has been examined in terms of Harris' concept of a "supervisor", Bennis' concept of a "change agent" and Rogers' concept of an "opinion-leader". This last concept was selected to define and examine the role of the coordinator and its influence on the system. The theoretical position of the role of the science coordinator was substantiated on the basis of the job description for this role. Thus the coordinator was defined as being firstly a science teacher and secondly, an opinion-leader in science curriculum innovations.

The theoretical position for this study can be briefly summarized. Each junior high school is an open system existing in and being sensitive to two supra-systems and having an internal environment. The aspect of its internal environment examined was the role relationships between certain subunits, in other words, the climate. One of the subunits functions in dual roles, namely those of science teacher and science coordinator. In response to changes in the external environment, a healthy organization will have internal changes. The major function of the coordinator is to facilitate internal change.

Related Literature

The theoretical and speculative literature pertaining

to organizations as systems, organizational climate, role relationships and innovations has been reviewed as part of the theoretical background. In Chapter III studies were presented which related climate and innovativeness to certain discrete characteristics of schools, principals, teachers, and the community. Only one study examined innovativeness as a function of a system rather than as a function of discrete variables. Only two studies examined the influence of climate upon innovativeness. One studied these relationships at the central office level and the other at the school level. In neither case was a systems model used.

The Problem, Sub-problems and Hypotheses

This study asked "Are there relationships between school organizational climates, the adoption of selected innovations and the role of the science coordinator in the junior high schools of a large urban school system?" (The Edmonton Public School System was used as the particular system in this study.) From this problem five sub-problems were isolated to examine the relationships between innovativeness and climate, innovativeness and the presence of a coordinator, innovativeness and certain leadership characteristics of the coordinator, climate and the presence of a coordinator, and finally, general leadership and opinion-leadership qualities of science coordinators.

To rephrase these sub-problems for analysis, thirteen null hypotheses were developed and tested. The first ten considered two aspects of innovativeness as the dependent variables, namely the number of different innovations and the extent of innovativeness. The independent variables associated with these first ten hypotheses were global climate, eight dimensions of climate, the presence of a resident coordinator, and a coordinator's opinion-leadership and general leadership characteristics. The next two null hypotheses examined the effect of the coordinator upon organizational climate. The last hypothesis examined the relationship between opinion-leadership and general leadership characteristics of the coordinator. Each null hypothesis postulated significant relationships between the dependent and independent variables though the direction of correlation was not suggested.

Sample

Measurements of organizational climate and innovativeness were obtained from forty-three schools out of a total of forty-four schools in the Edmonton Public School system. Each school contained at least one grade seven class. Most contained grades seven, eight and nine. Perceptions of the climate and the role of the coordinators were solicited from 187 science teachers of whom ten were also science coordinators. Perceptions of the role of the coordinator

and organizational climate were obtained from all ten coordinators. Five schools had assistant principals who had previously been science coordinators. Therefore thirty-eight schools were used to test those hypotheses which dealt with the effect of coordinators on innovativeness and the relationships between the innovativeness and leadership characteristics of coordinators. Thus four populations were sampled, namely, (1) all responding schools containing at least grade seven and perhaps grades eight and nine, (2) all responding schools having assistant principals who had not been science coordinators, (3) all science teachers teaching at least one science course in grade seven and/or eight and/or nine, and (4) all junior high school science coordinators.

Instruments Used

The global and subtest dimensions of organizational climate were assessed using the Organizational Climate Description Questionnaire. Innovativeness of the schools and the coordinators was determined by using two indices of innovativeness, namely the total number of different innovations and the extent to which science teachers in any one school were using these innovations. The general leadership characteristics and the opinion-leader characteristics of science coordinators were examined using the Leadership Behavior Description Questionnaire and a modified form of

Rogers' Self-Designating Opinion-Leadership Questionnaire respectively. Demographic information was obtained using a School Characteristic Questionnaire, a Teacher Characteristics Questionnaire and a Coordinator Characteristics Questionnaire.

Data Collection

The relevant instruments and accompanying letters were distributed to the principals, science teachers and coordinators through personal visits to each school. The responses were collected four days later, after an intervening week-end. Comments were received from, and discussions held, with all principals and coordinators and with many teachers. Prior to the distribution of materials the study had been explained to the science coordinators at a general meeting and to the principals through a letter from the office of the Director of Research, Edmonton Public School District.

Statistical Treatment

Five groups of null hypotheses were tested in terms of the degree, direction, percentage probability and significance of the correlation between the variables. In all cases linearity of regression was assumed. Pearson product-moment correlations and "t" ratios for significance at the .2, .1, .05 and .01 levels of confidence were obtained for null hypotheses dealing with two continuous variables.

Point biserial correlations and "F" ratios for significance at the same levels were obtained for null hypotheses dealing with a continuous and a categorical variable. Squared multiple correlations expressed as percentages were obtained for all null hypotheses. (The level of confidence reported for each null hypothesis was in every case the lowest level at which significance was observed.)

Results

The null hypothesis predicting no significant relationships between global climate and the number of innovations was rejected at the .1 level of confidence. A second null hypothesis concerning global climate and the extent of innovativeness was rejected at the .05 level. Innovativeness was shown to vary negatively with the degree of closedness of the climate. Null hypotheses predicting no significant relationships between Index I_1, numbers of innovations, and Consideration and Aloofness were rejected at the .01 level. This index correlated positively with Consideration and negatively with Aloofness. Similar null hypotheses dealing with Index I_2, extent of innovativeness, and Esprit, Intimacy, Aloofness and Consideration were rejected at the .1, .05, .01 and .01 levels respectively. This index correlated positively with all but Aloofness.

Both null hypotheses suggesting that there was no significant relationships between innovativeness of and the

presence of a resident coordinator in a school were rejected at the .01 level.

Generally, those hypotheses which predicted no significant relationships between innovativeness and certain leadership characteristics of the coordinator were accepted. However Representation and Tolerance of Freedom correlated strongly and positively with the numbers of innovations thus leading to a rejection of these null hypotheses.

Those null hypotheses which suggested that there would be no significant differences between the global and subtest dimensions of climates of schools with and without resident coordinators were also generally accepted. However, on the dimensions of Intimacy and Aloofness such hypotheses were rejected.

Finally the null hypotheses predicting no significant relationships between general leadership and innovations leadership characteristics was generally accepted except on the dimensions of Integration and Tolerance of Uncertainty which showed significance at the .1 level and Representation, Role Assumption and Consideration which showed significance at the .2 level.

II. CONCLUSIONS

On the basis of these results it is concluded that the number of science curriculum projects in a school was: (a) only slightly related positively to the degree of openness

of the climate, (b) highly related positively to the degree of consideration a principal shows to his staff, to the presence of a resident coordinator, to the degree to which a coordinator tolerates initiative and independent action among science teachers and acts as a spokesman for science teachers' concerns about science programs, (c) not related to any other investigated leadership characteristics of a coordinator, (d) highly related negatively to the degree of aloofness shown by a principal.

It was also concluded that the extent to which science program innovations occurred in a school was: (a) highly related positively to the degree of openness of climate, to the amount of consideration shown by the principal, the degree of intimacy among science teachers and to the presence of a resident coordinator, (b) highly related negatively to the degree of aloofness shown by the principal, (c) not related to any investigated leadership characteristics of a coordinator.

This second index was more sensitive than the first and emphasized the influence of the individual science teacher in the process of science program innovation.

The role of the science coordinator was shown to have no conclusive effect upon the overall climate of the school nor upon any climate dimensions investigated. There was also no significant relationship found between a science coordinator's self-perception as an opinion-leader and the

science teachers' perception of a coordinator as a leader.

These conclusions suggest the following: (a) that relationships between a principal and his science teachers based on consideration is a necessary condition for science curriculum innovations, (b) that innovativeness in the junior high schools of the Edmonton Public School District in 1968-1969 was mainly a result of the efforts of individual science teachers and is not directly attributable to any formal provisions made by the system, (c) that there is a complete lack of congruency between the science coordinators' perceptions of their role and the science teachers' expectations of that role, (d) that the science coordinators' perceptions of their own role is not clearly defined, (e) that science coordinators are virtually unknown to science teachers outside the coordinators' residence schools, (f) that science coordinators probably lack enough time, mobility and accessibility in order to work effectively with science teachers outside of the coordinators' residence schools, (g) that the science coordinator is most successful working in those task areas which do not demand close, cooperative, interpersonal relationships.

III. IMPLICATIONS OF THE STUDY AND SUGGESTED FURTHER RESEARCH

The findings and conclusions of this study seem to have implications for stimulating changes within a system's

organization for science education and for the study of the influence of role relationships upon innovations.

If the role of the science coordinator, as presently defined, is to be effective, then it is suggested: (1) that the coordinator should function only within the school in which he teaches without a reduction in the presently allotted time for his coordinating duties, or (2) that the coordinator should be freed from all teaching duties and given the time, mobility and accessibility to establish effective communications and working relationships primarily with all science teachers within his zone and secondarily with sources of information and materials outside the systems and (3) that science coordinators be appointed for one year during which time they would function as opinion-leaders. At the end of this year they could revert to the position of science teacher or be assigned to some other role which has formal authority for development and evaluation. The data for this study showed that the effect of assistant principals on innovativeness was significant enough to warrant controlling.

Basic to these suggestions and the effective functioning of the science coordinator is the observation that those responsible for making decisions concerning science curriculum innovations should: (1) evaluate the total school climate in terms of interpersonal relationships as part of planning for science curriculum changes, (2) define operationally, in

precise terms, the role of the science curriculum innovator, (3) communicate this role to all concerned and make provision for feedback concerning the expectations held for this role, (4) ensure that a science curriculum innovator has mobility and accessibility within the system and can move freely between the system and its environment.

Such suggestions are reinforced by the fact that some of Hewko's (1965) conclusions concerning the role of the coordinator are the same as some of those in the present study (completed four years later). Both studies have concluded that coordinators have insufficient time for their extra duties, that coordinators exhibit a strong lack of job definition, and that coordinators are not utilized as much in schools in which they are _not_ resident as they are in their residence schools.

In terms of school climate, the study suggests that characteristics of the principal, associated with his establishment of warm friendly and tolerant relationships, could be used to predict the extent to which innovations will occur in a school. A gross estimate or measurement of global climate might also be used for the same purpose, though with considerably greater caution.

The study also has implications for further research. The weaknesses of the OCDQ should be examined and some more sensitive instrument measuring the totality of interpersonal relationships devised. The rate of spread of curriculum

innovations between systems and their rate of passage through the stages of the adoption process could be examined using rural sociology studies as a model. Using Index I_2 or a similar index, the influence of the individual teacher upon the extent and rate of adoption of innovations could be studied. With the present tendency in large school systems towards decentralization of authority and roles, communications between schools, between schools and the central office of the system and between the system and its environment will become more of a problem. This problem of communication is reflected by ineffectiveness of the science coordinator working within a zonal concept. This latter is an area which needs much study, if for no other reason than to make effective use of personnel. Lastly, the method used in this study to determine the effect of climate upon innovativeness or vice versa seems fruitful. However the study should be repeated using a much larger population of schools in a larger supra-system and using more sensitive indicators of climate and innovativeness. Such instruments have yet to be developed.

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A P P E N D I C E S

APPENDIX A

Instruments

SCHOOL CHARACTERISTICS QUESTIONNAIRE

A. Descriptive

Kind of School: Check - Grades 1-8 ___
1-9 ___
7-9 ___

Age of School ________

Enrollment: Total pupils in school ________

Pupils in Grade 7 ___
8 ___
9 ___
Total ___

Pupils in Grade 7 Science ___
8 Science ___
9 Science ___
Total ___

Number of Classes: Grade 7 ___
8 ___
9 ___
Total ___

Grade 7 Science ___
8 Science ___
9 Science ___
Total ___

Number of Teachers: Total on staff ___

Teaching Grade 7 Science ___
8 Science ___
9 Science ___ Total ___

(Instructions: Count each teacher only once in the grade level in which he/she teaches his/her majority of science classes.)

Science Co-ordinator:

Is there a Science Co-ordinator on the teaching staff?
Yes ___ No ___

Is the assistant principal a former Science Co-ordinator?
Yes ___ No ___

Does the assistant principal perform the duties of a Science Co-ordinator in this school?
Yes ___ No ___

B. <u>Science Program Innovations</u> (Pilot Projects)

Please complete the following table:

1. by placing a check mark (✓) in the appropriate space if the project is in use now,

2. by stating:

   a. the year the project was started,
   b. the year it was discontinued,
   c. the number of students exposed to each project in 1968/69,
   d. the number of teachers using each project in 1968/69 (count a teacher more than once if he/she is using more than one project).

- - - - -

Project	Using Now	Year Begun	Dis-continued	No. of Students	No. of Teacher
Authorized Course/Dept, Education, Alberta					
Princeton Project (SSSP)					
Introduction to Physical Science					
Nuffield Biology (1)					
Earth Science Curriculum Project					
Exploring Earth Science					
Exploring Life Science					
Exploring Physical Science					
Life: Its Forms & Changes					
Matter: Its Forms & Changes					
Energy: Its Forms & Changes					
Physical Science: A Laboratory Approach					
A combination of two or more of the above					
Totals					

TEACHER CHARACTERISTICS QUESTIONNAIRE

A. Descriptive

Are you a Science Co-ordinator? Yes ___ No ___

Age __________ Sex: Male ___ Female ___

Teaching Experience: Please indicate the number of years of teaching experience in each of the following areas:

Science teaching (at least one course per year at any level) __________

Junior High School science teaching __________

Junior High School teaching __________

Teaching at present school __________

Science teaching at present school __________

Training: Please indicate the number of years of training in each of the following areas:

Post-secondary school training in education __________

Post-secondary school training in other fields __________

Total post-secondary school training __________

Other Experience:

How many years have you worked in educational activities not included previously in this questionnaire? ________

How many years have you worked in professional activities outside the field of education? ________

Expertise: In which of the following teaching areas do you consider yourself to be most competent?

____ a. Physics
____ b. Chemistry
____ c. Geology
____ d. Biology
____ e. Foreign languages
____ f. English
____ g. Social Studies
____ h. Counselling
____ i. Physical Education
____ j. Mathematics
____ k. Geography
____ l. Other (Specify) ________
____

B. Science Program Innovations (Pilot Projects)

Please complete the following table by:

a. showing the number of classes you are involving in each project,
b. checking those projects you were only aware of in 1967,
c. checking those projects you were using in 1967,
d. checking those projects you were only aware of in 1968,
e. checking those projects you are using in 1968-69.

(Note: If you are using a combination of projects, please show which ones by writing down the grade level, e.g. 7, 8, or 9, beside the appropriate project in the column headed "using in part 1968-69".)

- - - - - - - -

Project	No. of Classes	Aware 1967	Using 1967	Aware 1968	Using 1968	Using in part 1968
Authorized Course/Dept. Education, Alberta	______	______	______	______	______	______
Princeton Project (SSSP)	______	______	______	______	______	______
Introduction to Physical Science	______	______	______	______	______	______
Nuffield Biology (1)	______	______	______	______	______	______
Earth Science Curriculum Project	______	______	______	______	______	______
Exploring Life Science	______	______	______	______	______	______
Exploring Earth Science	______	______	______	______	______	______
Exploring Physical Science	______	______	______	______	______	______
Life: Its Forms & Changes	______	______	______	______	______	______
Matter: Its Forms & Changes	______	______	______	______	______	______
Energy: Its Forms & Changes	______	______	______	______	______	______
Physical Science: A Laboratory Approach	______	______	______	______	______	______
A combination of two or more of the above	______	N/A	N/A	N/A	N/A	______
Totals	______					

C. Characteristics of Science Program Innovations (Pilot Projects)

Please rate each of the projects with which you are familiar by placing a number from 1-9 under each of the five characteristics beside each project in the table. Each characteristic and its scale is described as follows:

a. Relative Advantage - the relative advantage of using the project to achieve the educational goals as you see them as compared with the science program and/or textbook it (they) has replaced.

1 .. 2 .. 3 .. 4 .. 5 .. 6 .. 7 .. 8 .. 9 ..
no advantage — 100 % advantage

b. Compatibility - the degree to which the project is compatible or harmonious with the rest of the science programs in your school.

1 .. 2 .. 3 .. 4 .. 5 .. 6 .. 7 .. 8 .. 9 ..
not compatible — 100 % compatible

c. Complexity - the relative difficulty of using these projects as compared with using the science courses and materials prescribed by the Department of Education, Alberta.

1 .. 2 .. 3 .. 4 .. 5 .. 6 .. 7 .. 8 .. 9 ..
very complex — not complex

d. Divisibility - the degree to which the project must be presented in its entirety.

1 .. 2 .. 3 .. 4 .. 5 .. 6 .. 7 .. 8 .. 9 ..
not divisible — easily divisible

e. Communicability - the relative ease of communicating your ideas and findings concerning each project to science teachers and other professional workers in education.

1 .. 2 .. 3 .. 4 .. 5 .. 6 .. 7 .. 8 .. 9 ..
not communicable — easily communicable

Project	Relative Advantage	Compatibility	Complexity	Divisibility	Communicability	Total
Princeton Project (SSS)	____	____	____	____	____	____
Introduction to Physical Science	____	____	____	____	____	____
Nuffield Biology (1)	____	____	____	____	____	____
Earth Science Curriculum Project	____	____	____	____	____	____
Exploring Earth Science	____	____	____	____	____	____
Exploring Life Science	____	____	____	____	____	____
Exploring Physical Science	____	____	____	____	____	____
Life: Its Forms & Changes	____	____	____	____	____	____
Matter: Its Forms & Changes	____	____	____	____	____	____
Energy: Its Forms & Changes	____	____	____	____	____	____
Physical Science: A Laboratory Approach	____	____	____	____	____	____
Totals						

COORDINATOR CHARACTERISTICS QUESTIONNAIRE

(Note: You will notice that this questionnaire is divided into three sections. The first deals with job performance, the second with job satisfaction, and the third with role perception. Please be completely frank and honest in all your replies under the assurance that they will be kep confidential. The treatment of results will ensure anonymity.)

Job Performance

1. How much total time do you have allotted to you for the performance of activities associated with your position as a coordinator?

___a. 1/4 - 1/2 working days/week
___b. 1/2 - 1 working day/week
___c. 1 - 1 1/2 working days/week
___d. 1 1/2 - 2 working days/week
___e. 2 - 2 1/2 working days/week
___f. 2 1/2 - 3 working days/week
___g. more than 3 working days/week

2. How often (on the average) do you visit each school in you zone each month?

___a. less than once a month
___b. at least once a month
___c. at least twice a month
___d. at least three times a month
___e. at least four times a month
___f. at least five times a month
___g. at least six times a month
___h. more frequently

3. How many meetings per month do you, in your role as a coordinator, have (on a regular basis)?

A. with science teachers in the school in which you are also a teacher?

___a. 0
___b. 1-3
___c. 4-6
___d. 7-9
___e. 10-12
___f. 13-15
___g. more often

B. with science teachers in other schools in your zone?

___a. 0
___b. 1-3
___c. 4-6
___d. 7-9
___e. 10-12
___f. 13-15
___g. more often

C. with other coordinators and/or central office staff, and/or university staff, and/or other professionals?

___ a. 0
___ b. 1-3
___ c. 4-6
___ d. 7-9
___ e. 10-12
___ f. 13-15
___ g. more often

Job Satisfaction

4. Do you feel that you have adequate time to accomplish your duties as a co-ordinator? Yes ___ No ___

5. Do you feel that you have sufficient authority to perform any or all of your duties adequately?
Yes ___ No ___

6. Do you feel that the additional financial benefits for the duties of co-ordinator are adequate?
Yes ___ No ___

7. Have you encountered opposition to your role serious enough to impede your endeavours from:

a. Administrative personnel? Yes ___ No ___
b. Teachers within your own school? Yes ___ No ___
c. Teachers within other schools in your zone? Yes ___ No ___

8. Rate how successful you feel you have been in terms of your accomplishments and/or contributions by placing a check mark (✓) beside each activity under the appropriate section of the scale.

Activity	Very satisfied	Satisfied	Slightly Satisfied	Slightly Dissatisfied	Dissatisfied	Very Dissatisfied
Co-operative teaching - own school	___	___	___	___	___	___
Co-operative teaching - other schools	___	___	___	___	___	___
Pilot Projects - own school	___	___	___	___	___	___
Pilot Projects - other schools	___	___	___	___	___	___
Assisting Teachers - own school	___	___	___	___	___	___
Assisting Teachers - other schools	___	___	___	___	___	___
Assisting in special projects	___	___	___	___	___	___
Providing and developing resource materials	___	___	___	___	___	___

<u>Role Perception as an Opinion-leader</u> (adapted from <u>Rogers, E.M.</u>)

9. During the past six months have you told anyone about new teaching practices? Yes ___ No ___

10. Compared with your fellow teachers are you

    a. More likely ______
    b. Less likely ______

    to be asked for advice about new teaching practices?

11. Thinking back to your last discussion about new teaching practices:

    a. were you asked more frequently for your opinion of the new practices? ______
    b. did you frequently ask someone else for their opinion? ______

12. When you and your fellow teachers discuss new ideas about teaching practices what part do you play?

    a. mainly listen ________
    b. try to convince them of your ideas ________

13. Which of these happens more frequently.

    a. Do you tell your fellow teachers about new teaching practices? ________
    b. Do they tell you about new practices? ________

14. Do you have a feeling that you are generallp regarded by your fellow teachers and friends as a good source of advice about new teaching practices?
    Yes _____ No ____

ORGANIZATIONAL CLIMATE DESCRIPTION QUESTIONNAIRE

(Developed by Andrew W. Halpin and Don B. Croft)

On the following pages is a list of items that are used to describe the organizational climate or the "personality" of your school. The items describe typical behaviors or conditions that occur within a school. Please indicate to what extent each of these descriptions characterizes your school. Please do not evaluate the items in terms of "good" or "bad" behavior but read each item carefully and respond in terms of how well the statement describes your school.

It is important your answers be "independent" so please do not discuss your answers with other teachers. Though there is no time limit, it will probably take you 15 to 20 minutes to complete.

Please be frank in your responses with the assurance that individual responses are strictly confidential.

DIRECTIONS:

a. Read each item carefully.
b. Think about how well the statement describes your school.
c. Decide whether the behavior or condition describes in the item occurs rarely, sometimes, often, or very frequently in your school.
d. Draw a circle around one of the four letters following the item to show the answer you have selected.
e. Please respond to every item.

Key: A -- Very Frequently Occurs
B -- Often Occurs
C -- Sometimes Occurs
D -- Rarely Occurs

- - - - - - -

1. Teachers' closest friends are other faculty members at this school. A B C D

2. The mannerisms of teachers at this school are annoying. A B C D

3. Teachers spend time after school with students who have individual problems. A B C D

4. Instructions for the operation of teaching aids are available. A B C D

5. Teachers invite other faculty members to visit them at home. A B C D

6. There is a minority group of teachers who always oppose the majority. A B C D

7. Extra books are available for classroom use. A B C D

8. Sufficient time is given to prepare administrative reports. A B C D

9. Teachers know the family background of other faculty members. A B C D

10. Teachers exert group pressure on non-conforming faculty members. A B C D

11. In faculty meetings, there is the feeling of "let's get things done". A B C D

12. Administrative paper work is burdensome at this school. A B C D

13. Teachers talk about their personal life to other faculty members. A B C D

14. Teachers seek special favors from the principal. A B C D

15. School supplies are readily available for use in classwork. A B C D

16. Student progress reports require too much work. A B C D

17. Teachers have fun socializing together during school time. A B C D

18. Teachers interrupt other faculty members who are talking in staff meetings. A B C D

19. Most of the teachers here accept the faults of their colleagues. A B C D

20. Teachers have too many committee requirements. A B C D

21. There is considerable laughter when teachers gather informally. A B C D

22. Teachers ask nonsensical questions in faculty meetings. A B C D

23. Custodial service is available when needed. A B C D

24. Routine duties interfere with the job of teaching. A B C D

25. Teachers prepare administrative reports by themselves. A B C D

26. Teachers ramble when they talk in faculty meetings. A B C D

27. Teachers at this school show much school spirit. A B C D

28. The principal goes out of his way to help teachers. A B C D

29. The principal helps teachers solve personal problems. A B C D

30. Teachers at this school stay by themselves. A B C D

31. The teachers accomplish their work with great vim, vigor, and pleasure. A B C D

32. The principal sets an example by working hard himself. A B C D

33. The principal does personal favors for teachers. A B C D

34. Teachers eat lunch by themselves in their own classrooms. A B C D

35. The morale of the teachers is high. A B C D

36. The principal uses constructive criticism. A B C D

37. The principal stays after school to help teachers finish their work. A B C D

38. Teachers socialize together in small select groups. A B C D

39. The principal makes a-1 class-scheduling decisions. A B C D

40. Teachers are contacted by the principal each day. A B C D

41. The principal is well prepared when he speaks at school function. A B C D

42. The principal helps staff members settle minor differences. A B C D

43. The principal schedules the work for the teachers. A B C D

44. Teachers leave the grounds during the school day. A B C D

45. Teachers help select which courses will be taught. A B C D

46. The principal corrects teachers' mistakes. A B C D

47. The principal talks a great deal. A B C D

48. The principal explains his reasons for criticism to teachers. A B C D

49. The principal tries to get better salaries for teachers. A B C D

50. Extra duty for teachers is posted conspicuously. A B C D

51. The rules set by the principal are never questioned. A B C D

52. The principal looks out for the personal welfare of teachers. A B C D

53. School secretarial service is available for teachers' use. A B C D

54. The principal runs the faculty meeting like a business conference. A B C D

55. The principal is in the building before teachers arrive. A B C D

56. Teachers work together preparing administrative reports. A B C D

57. Faculty meetings are organized according to a tight agenda. A B C D

58. Faculty meetings are mainly principal-report meetings. A B C D

59. The principal tells teachers of new ideas he has run across.	A	B	C	D
60. Teachers talk about leaving the school system.	A	B	C	D
61. The principal checks the subject-matter ability of teachers.	A	B	C	D
62. The principal is easy to understand.	A	B	C	D
63. Teachers are informed of the results of a supervisor's visit.	A	B	C	D
64. The principal insures that teachers work to their full capacity.	A	B	C	D

LEADER BEHAVIOR DESCRIPTION QUESTIONNAIRE—Form XII

Originated by staff members of
The Ohio State Leadership Studies
and revised by the
Bureau of Business Research

Purpose of the Questionnaire

On the following pages is a list of items that may be used to describe the behavior of your supervisor. Each item describes a specific kind of behavior, but does not ask you to judge whether the behavior is desirable or undesirable. Although some items may appear similar, they express differences that are important in the description of leadership. Each item should be considered as a separate description. This is not a test of ability or consistency in making answers. Its only purpose is to make it possible for you to describe, as accurately as you can, the behavior of your supervisor.

Note: The term, "*group*," as employed in the following items, refers to a department, division, or other unit of organization that is supervised by the person being described.

The term "*members*," refers to all the people in the unit of organization that is supervised by the person being described.

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DIRECTIONS:

a. READ each item carefully.

b. THINK about how frequently the leader engages in the behavior described by the item.

c. DECIDE whether he (A) *always*, (B) *often*, (C) *occasionally*, (D) *seldom* or (E) *never* acts as described by the item.

d. DRAW A CIRCLE around *one* of the five letters (A B C D E) following the item to show the answer you have selected.

A = Always

B = Often

C = Occasionally

D = Seldom

E = Never

e. MARK your answers as shown in the examples below.

Example: He often acts as described	A	B	C	D	E
Example: He never acts as described	A	B	C	D	E
Example: He occasionally acts as described	A	B	C	D	E

---

1. He acts as the spokesman of the group	A	B	C	D	E
2. He waits patiently for the results of a decision	A	B	C	D	E
3. He makes pep talks to stimulate the group	A	B	C	D	E
4. He lets group members know what is expected of them	A	B	C	D	E
5. He allows the members complete freedom in their work	A	B	C	D	E
6. He is hesitant about taking initiative in the group	A	B	C	D	E
7. He is friendly and approachable	A	B	C	D	E
8. He encourages overtime work	A	B	C	D	E
9. He makes accurate decisions	A	B	C	D	E
10. He gets along well with the people above him	A	B	C	D	E
11. He publicizes the activities of the group	A	B	C	D	E
12. He becomes anxious when he cannot find out what is coming next	A	B	C	D	E

A = Always

B = Often

C = Occasionally

D = Seldom

E = Never

13. His arguments are convincing	A	B	C	D	E
14. He encourages the use of uniform procedures	A	B	C	D	E
15. He permits the members to use their own judgment in solving problems.	A	B	C	D	E
16. He fails to take necessary action	A	B	C	D	E
17. He does little things to make it pleasant to be a member of the group	A	B	C	D	E
18. He stresses being ahead of competing groups	A	B	C	D	E
19. He keeps the group working together as a team	A	B	C	D	E
20. He keeps the group in good standing with higher authority	A	B	C	D	E
21. He speaks as the representative of the group	A	B	C	D	E
22. He accepts defeat in stride	A	B	C	D	E
23. He argues persuasively for his point of view	A	B	C	D	E
24. He tries out his ideas in the group	A	B	C	D	E
25. He encourages initiative in the group members	A	B	C	D	E
26. He lets other persons take away his leadership in the group	A	B	C	D	E
27. He puts suggestions made by the group into operation	A	B	C	D	E
28. He needles members for greater effort	A	B	C	D	E
29. He seems able to predict what is coming next	A	B	C	D	E
30. He is working hard for a promotion	A	B	C	D	E
31. He speaks for the group when visitors are present	A	B	C	D	E
32. He accepts delays without becoming upset	A	B	C	D	E
33. He is a very persuasive talker	A	B	C	D	E
34. He makes his attitudes clear to the group	A	B	C	D	E
35. He lets the members do their work the way they think best	A	B	C	D	E
36. He lets some members take advantage of him	A	B	C	D	E

A = Always

B = Often

C = Occasionally

D = Seldom

E = Never

37. He treats all group members as his equals.	A	B	C	D	E
38. He keeps the work moving at a rapid pace.	A	B	C	D	E
39. He settles conflicts when they occur in the group.	A	B	C	D	E
40. His superiors act favorably on most of his suggestions.	A	B	C	D	E
41. He represents the group at outside meetings.	A	B	C	D	E
42. He becomes anxious when waiting for new developments.	A	B	C	D	E
43. He is very skillful in an argument.	A	B	C	D	E
44. He decides what shall be done and how it shall be done.	A	B	C	D	E
45. He assigns a task, then lets the members handle it.	A	B	C	D	E
46. He is the leader of the group in name only.	A	B	C	D	E
47. He gives advance notice of changes.	A	B	C	D	E
48. He pushes for increased production.	A	B	C	D	E
49. Things usually turn out as he predicts.	A	B	C	D	E
50. He enjoys the privileges of his position.	A	B	C	D	E
51. He handles complex problems efficiently.	A	B	C	D	E
52. He is able to tolerate postponement and uncertainty.	A	B	C	D	E
53. He is not a very convincing talker.	A	B	C	D	E
54. He assigns group members to particular tasks.	A	B	C	D	E
55. He turns the members loose on a job, and lets them go to it.	A	B	C	D	E
56. He backs down when he ought to stand firm.	A	B	C	D	E
57. He keeps to himself.	A	B	C	D	E
58. He asks the members to work harder.	A	B	C	D	E
59. He is accurate in predicting the trend of events.	A	B	C	D	E
60. He gets his superiors to act for the welfare of the group members.	A	B	C	D	E

A — Always

B — Often

C — Occasionally

D — Seldom

E — Never

61. He gets swamped by details............	A	B	C	D	E
62. He can wait just so long, then blows up............	A	B	C	D	E
63. He speaks from a strong inner conviction............	A	B	C	D	E
64. He makes sure that his part in the group is understood by the group members	A	B	C	D	E
65. He is reluctant to allow the members any freedom of action............	A	B	C	D	E
66. He lets some members have authority that he should keep............	A	B	C	D	E
67. He looks out for the personal welfare of group members............	A	B	C	D	E
68. He permits the members to take it easy in their work............	A	B	C	D	E
69. He sees to it that the work of the group is coordinated............	A	B	C	D	E
70. His word carries weight with his superiors............	A	B	C	D	E
71. He gets things all tangled up............	A	B	C	D	E
72. He remains calm when uncertain about coming events............	A	B	C	D	E
73. Hs is an inspiring talker............	A	B	C	D	E
74. He schedules the work to be done............	A	B	C	D	E
75. He allows the group a high degree of initiative............	A	B	C	D	E
76. He takes full charge when emergencies arise............	A	B	C	D	E
77. He is willing to make changes............	A	B	C	D	E
78. He drives hard when there is a job to be done............	A	B	C	D	E
79. He helps group members settle their differences............	A	B	C	D	E
80. He gets what he asks for from his superiors............	A	B	C	D	E
81. He can reduce a madhouse to system and order............	A	B	C	D	E
82. He is able to delay action until the proper time occurs............	A	B	C	D	E
83. He persuades others that his ideas are to their advantage............	A	B	C	D	E

A = Always

B = Often

C = Occasionally

D = Seldom

E = Never

84. He maintains definite standards of performance	A	B	C	D	E
85. He trusts the members to exercise good judgment	A	B	C	D	E
86. He overcomes attempts made to challenge his leadership	A	B	C	D	E
87. He refuses to explain his actions	A	B	C	D	E
88. He urges the group to beat its previous record	A	B	C	D	E
89. He anticipates problems and plans for them	A	B	C	D	E
90. He is working his way to the top	A	B	C	D	E
91. He gets confused when too many demands are made of him	A	B	C	D	E
92. He worries about the outcome of any new procedure	A	B	C	D	E
93. He can inspire enthusiasm for a project	A	B	C	D	E
94. He asks that group members follow standard rules and regulations	A	B	C	D	E
95. He permits the group to set its own pace	A	B	C	D	E
96. He is easily recognized as the leader of the group	A	B	C	D	E
97. He acts without consulting the group	A	B	C	D	E
98. He keeps the group working up to capacity	A	B	C	D	E
99. He maintains a closely knit group	A	B	C	D	E
100. He maintains cordial relations with superiors	A	B	C	D	E

APPENDIX B

Correspondence

Department of Secondary Education,
University of Alberta,
Edmonton 7, Alberta.

Dear

As a graduate student in the Faculty of Education I am working independently on a thesis which will examine the possibility of relationships existing between school climate (defined as the "personality" of the school), the role of the junior high school science coordinator and the extent of science curriculum innovations in the junior high schools of the Edmonton Public School System. It has been observed by both practitioner and theoretician alike that the process of education is quite unique, in comparison with other organized processes, in the kinds of interpersonal relationships (the climate) which become established between staff members. I am suggesting, in this study, that there might be some connections between these relationships and certain characteristics of innovations, as exemplified by science curriculum pilot projects. In terms of these relationships the science coordinator occupies a significant position. However, just how this position relates operationally to the climate and programs of various schools with which he is associated is not clear; in other words, to what extent is the coordinator either a formal leader in the system or an opinion leader?

In order to help shed some light on these concerns would you mind completing the following enclosed questionnaires?

1. Organizational Climate Description Questionnaire:

This should take about 15-20 minutes to complete. Please express honestly and precisely your opinion on all the statements listed even though some may apply only indirectly to your situation. Because of the method of treating this data each item has, by itself, little direct significance and carries absolutely no value judgments in terms of this study. Please work independently and do not sign your name.

2. School Characteristics Questionnaire:

You will notice that there are two sections to this. The first is concerned with a description of your school and the second with the kinds of science curriculum innovations, if any, which are under way.

I appreciate the amount of your time involved in completing these questionnaires and can assure you:

1. that there will be complete anonymity in both the analysis of the data and the reporting of the findings.

2. that all raw data will be destroyed after it has been analyzed.

3. that, because of the complexity of school operations, no value judgments will be made.

4. that you will receive a brief summary of the findings of this study.

5. that all questionnaires will have only a code number for compilation purposes.

Thank you for your cooperation and participation in this study.

Yours sincerely,

R.P. Heron

P.S. - PLEASE REPLACE ALL QUESTIONNAIRES IN THE ENVELOPE IN WHICH THEY ARRIVED.

Department of Secondary Education,
University of Alberta,
Edmonton 7, Alberta.

February, 1969.

Dear Colleague,

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In order to help shed some light on these concerns would you mind completing the following enclosed questionnaires?

1. <u>Organizational Climate Description Questionnaire</u>:

This should take about 15-20 minutes to complete. Please express honestly and precisely your opinion on all the statements listed even though some may apply only indirectly to your situation. Because of the method of treating this data each item has, by itself, little direct significance and carries absolutely no value judgments in terms of this study. Please work independently and do not sign your name.

2. <u>Teacher Characteristics Questionnaire</u>:

This questionnaire is divided into three sections - a descriptive part, a part which describes what pilot projects, if any, you are involved with, and a part in which you evaluate these projects. It should take about 15-20 minutes to complete.

3. Leadership Behavior Description Questionnaire:

All that is required in completing this questionnaire is for you to describe your science coordinator's behavior as accurately as possible by expressing an opinion on every statement even though it may have slight relevance for you. The method used is the same as for the OCDQ (1.). This should take about 20-30 minutes. Please work independently. Neither your name nor that of your coordinator should appear on the questionnaire.

I appreciate the amount of your time involved in completing these questionnaires and can assure you:

1. that there will be complete anonymity in both the analysis of the data and the reporting of the findings.
2. that all raw data will be destroyed after it has been analyzed.
3. that, because of the complexity of school operations, no value judgments will be made.
4. that you will receive a brief summary of the findings of this study.
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In order to help shed some light on these concerns would you mind completing the following enclosed questionnaires?

1. Organizational Climate Description Questionniare:

This should take about 15-20 minutes to complete. Please express honestly and precisely your opinion on all the statements listed even though some may apply only indirectly to your situation. Because of the method of treating this data each item has, by itself, litttle direct significance and carries absolutely no value judgments in terms of this study. Please work independently and do not sign your name.

2. Teacher Characteristics Questionnaire:

This questionnaire has relevance to this study in considering your role as a teacher. It should take you about 15-20 minutes to complete. It is divided into three sections - a descriptive part, and part which describes the pilot projects, if any, you are involved with, and your opinion of these pilot projects. Do not sign your name.

3. Leadership Behavior Description Questionnaire:

This should take you about 20-25 minutes to complete. Please work independently. All that is required is that, using the same method as you used to complete the OCDQ (1.), you describe your own leadership behavior as accurately as possible, rewording the statements to make them applicable to yourself and expressing an opinion on all the statements even though some may be only slightly relevant to you in your situation. Do not sign your name.

4. Coordinator Characteristics Questionnaire:

This questionnaire is also composed of three sections and should take you about 20 minutes to complete. The first part deals with your job performance, the second with your job satisfaction and the third with your perception of yourself as an opinion leader. Do not sign your name.

I appreciate the amount of your time involved in completing these questionnaires and can assure you:

1. that there will be complete anonymity in both the analysis of the data and the reporting of the findings.

2. that all raw data will be destroyed after it has been analyzed.

3. that, because of the complexity of school operations, no value judgments will be made.

4. that you will receive a brief summary of the findings of this study.

5. that all questionnaires will have only a code number for compilation purposes.

Thank you for your cooperation and participation in this study.

Yours sincerely,

R.P. Heron

P.S. - PLEASE REPLACE ALL QUESTIONNAIRES IN THE ENVELOPE IN WHICH THEY ARRIVED.

APPENDIX C

Returns

DISTRIBUTION AND RETURNS OF THE SAMPLING INSTRUMENTS AS COMPLETED BY SCIENCE TEACHERS, COORDINATORS AND PRINCIPALS

Instrument	Completed by	Distributed #	No Returns #	No Returns %	Spoiled Returns #	Spoiled Returns %	Complete Returns #	Complete Returns %
1. School Characteristics Questionnaire	Principals	44	1	2.3	0	0.0	43	97.7
2. Teacher Characteristics Questionnaire	Teachers (N=174)	174	28	15.6	11	6.3	135	78.2
	Coordinators (N=10)	10	0	0.0	0	0.0	10	100.0
	Total (N=184)	184	28	14.6	11	6.1	145	79.2
3. Coordinator Characteristics Questionnaire	Coordinators (N=10)	10	0	0.0	0	0.0	10	100.0
4. OCDQ	Principals (N=44)	44	1	2.3	0	0.0	43	97.7
	Teachers (N=174)	174	29	16.6	6	3.4	139	79.9
	Coordinators (N=10)	10	0	0.0	0	0.0	10	100.0
	Total (N=228)	228	30	13.15	6	2.63	192	84.22
5. LBDQ: a) In Schools with Coordinators	Coordinators (N=10)	10	0		0		10	100.0
	Teachers (N=44)	44	10	22.66	5	11.33	29	66.01
	Total	54	10	18.50	5	9.25	39	72.25
b) In Schools without Coordinators	Teachers (N=130)	130	28	21.25	26	20.00	76	58.75
c) All Schools	Total Teachers (N=174)	174	38	21.80	31	17.65	105	60.6
d) All Schools	Total Coordinators and Teachers (N=184)	184	38	20.60	31	16.8	115	62.6

APPENDIX D

School Characteristics

APPENDIX D1

FREQUENCY DISTRIBUTION OF JUNIOR HIGH SCHOOLS AND COMBINED SCHOOLS BY CLIMATE CATEGORIES

Climate	Junior High Schools (N=16)		Combined Schools[1] (N=27)		Total (N=43)	
	f	%	f	%	f	%
Open	2	12.6	10	37.0	12	28.0
Autonomous	1	6.2	3	11.1	4	9.3
Controlled	1	6.2	3	11.1	4	9.3
Familiar	4	25.5	1	3.7	5	11.6
Paternal	1	6.2	3	11.1	4	9.3
Closed	7	43.8	7	26.0	14	32.5
	16	100.0	27	100.0		100.0

[1]Schools with grades 1-7, 1-8, 1-9, 4-7, 4-9.

APPENDIX D2

DISTRIBUTION OF JUNIOR HIGH SCHOOLS AND COMBINED SCHOOLS BY NUMBER AND NUMBER INNOVATING

Characteristic	Junior High Schools (N=16)		Combined Schools (N=27)		Total	
	#	%	#	%	#	%
Number	16 (17)	37.2	27	62.8	43 (44)	100.0
Innovating	13	30.2	19	44.2	32	74.4
Not Innovating	3 (4)	7.0	8	18.6	11 (12)	25.6

Note: Brackets refer to total population. All other figures are from respondents.

APPENDIX D3

DISTRIBUTION OF JUNIOR HIGH SCHOOLS AND COMBINED SCHOOLS BY NUMBERS OF TEACHERS OF SCIENCE AND ASSISTANT PRINCIPALS AS EX-COORDINATORS

Characteristics	Junior High Schools (N=16)		Combined Schools (N=27)		Total	
	#	%	#	%	#	%
Assistant Principals	4		1		5	
Science Teachers	68 (100)	50.4	67 (77)	49.6	135 (177)	100.0
Science Coordinators	6	60.0	4	40.0	10	100.0
Teachers of Science	74 (106)	51.0	71 (81)	49.0	145 (187)	100.0

Note: Bracketed numbers refer to all teachers in a category.

APPENDIX D4

DISTRIBUTION OF SCHOOLS FORMING THE COMBINED SCHOOL GROUP BY PUPIL ENROLLMENT, NUMBER OF SCIENCE CLASS AND NUMBER OF TEACHERS

Characteristics	Schools Grades 1 - 9	Schools Grades 1 - 8	Schools Grades 1 - 7	Schools Grades 4 - 7	Schools Grades 4 - 9	Total Combined
Number of Schools	21	1	3	1	1	27
Mean number of Pupils	280.1	144	103.7	200	509	265.7
Mean number of Science Classes	9.2	5	6	6	18	9.2
Mean number of Science Teachers	3.0	1	2	2	6	3.0

APPENDIX E

Science Teacher and Science Coordinator Characteristics

APPENDIX E1

FREQUENCY DISTRIBUTION OF SCIENCE TEACHERS AND COORDINATORS BY SCIENCE TEACHING EXPERIENCE IN BOTH GRADES 7-9 AND TOTAL EXPERIENCE

Number of Years	Teachers (N=135)				Coordinators (N=10)				All Teachers of Science			
	In Grs. 7 - 9		Total		In Grs. 7 - 9		Total		In Grs. 7 - 9		Total	
	f	%	f	%	f	%	f	%	f	%	f	%
45 - 49			1	.7							1	.7
40 - 44												
35 - 39	1	.7	2	1.5					1	.7	2	1.4
30 - 34	1	.7							1	.7		
25 - 29	2	1.5	1	.7					2	1.4	1	.7
20 - 24	1	.7	5	3.7	1	10.0	1	10.0	2	1.4	6	4.1
15 - 19	6	4.5	7	5.2	1	10.0	1	10.0	7	4.8	8	5.5
10 - 14	9	6.7	14	10.4					9	6.2	14	9.6
5 - 9	33	24.4	37	27.4	4	40.0	5	50.0	37	25.5	42	29.0
0 - 4	82	60.8	68	50.4	4	40.0	3	30.0	86	59.3	71	49.0
		100.0		100.0		100.0		100.0		100.0		100.0
Mean	5.5		6.9		7.5		8.0		5.6		7.0	
S.D.	6.15		7.34		6.30		7.00		6.20		7.30	

APPENDIX E2a

FREQUENCY DISTRIBUTION OF THE NUMBER OF YEARS OF POST-SECONDARY SCHOOL FORMAL TRAINING OF SCIENCE TEACHERS IN GRADES 7-9
(N=135)

No. of Years	In Education f	In Education %	In Other Fields f	In Other Fields %	In Total f	In Total %
7	0	0	0	0	8	5.9
6	7	5.10	2	1.5	21	15.5
5	11	8.5	5	3.6	24	17.8
4	52	38.50	9	6.7	54	40.0
3	18	13.30	21	15.6	16	11.9
2	18	13.30	7	5.2	7	5.2
1	25	18.4	12	8.8	2	1.5
0	4	2.9	79	58.6	3	2.2
	135	100.0 0		100.0		100.0
Mean	3.11 years		1.20 years		4.31 years	
S.D.	1.50		2.40		1.94	

APPENDIX E2b

FREQUENCY DISTRIBUTION OF THE NUMBER OF YEARS OF POST-SECONDARY SCHOOL FORMAL TRAINING OF SCIENCE COORDINATORS IN GRADES 7-9
(N=10)

No. of Years	In Education f	In Education %	In Other Fields f	In Other Fields %	In Total f	In Total %
7	0		0		0	
6	0		0		0	
5	1	10.0	0		3	30.0
4	5	50.0	2	20.0	5	50.0
3	0		0		0	
2	0		1	10.0	1	10.0
1	3	30.0	0		1	15.0
0	1	10.0	7	70.0	0	
		100.0		100.0		100.0
Mean	2.8 years		1.0 years		3.80 years	
S.D.	1.68		2.54		1.42	

APPENDIX E2c

FREQUENCY DISTRIBUTION OF THE NUMBERS OF YEARS OF POST-SECONDARY SCHOOL FORMAL TRAINING OF ALL TEACHERS TEACHING SCIENCE IN GRADES 7-9

No. of Years	In Education		In Other Fields		In Total	
	f	%	f	%	f	%
7	0		0		8	5.5
6	7	4.8	2	1.4	21	14.5
5	12	8.3	5	3.4	27	18.6
4	57	39.3	11	7.6	59	40.7
3	18	12.4	21	14.5	16	11.0
2	18	12.4	8	5.5	8	5.5
1	28	19.3	12	8.3	3	2.1
0	5	3.5	86	59.3	3	2.1
		100.0		100.0		100.0
Mean	3.1 years		1.2 years		4.3 years	
S.D.	1.75		2.46		1.91	

APPENDIX F

Science Coordinators' Role Satisfaction

COORDINATORS' EXPRESSION OF JOB SATISFACTION ON SEVERAL DIMENSIONS

	Yes %	No %
(1) Have you adequate time to accomplish your duties as coordinator?	40	60
(2) Have you sufficient authority to perform your duties?	80	20
(3) Are the additional financial benefits adequate?	1	9
(4) Have you encountered serious opposition from:		
(a) Administrative personnel?	1*	9
(b) Two teachers in your own school?	1*	9
(c) Teachers in other schools in your zone?	1*	9

*Each is a different respondent.

APPENDIX G

APPENDIX G

INTERCORRELATION MATRIX OF ALL CLIMATE SUBTESTS AND GLOBAL CLIMATE

	Dis-engagement 1	Hind-rance 2	Esprit 3	Intim-acy 4	Aloof-ness 5	Production Emphasis 6	Thrust 7	Consider-ation 8	Global Climate 9
Disengagement	1.000	.315[b]	-.517[a]	-.105	-.033	.051	-.224	-.110	.530[a]
Hindrance		1.000	-.536[a]	.027	.094	.115	-.318[b]	.007	.538[a]
Esprit			1.000	.481[a]	-.108	.048	.593[a]	.435[a]	-.779[a]
Intimacy				1.000	-.220	-.072	.154	.347[b]	-.154
Aloofness					1.000	.564[a]	-.044	-.123	.221
Production Emphasis						1.000	.031	.003	.170
Thrust							1.000	.727[a]	-.675[a]
Consideration								1.000	-.439[a]
Global Climate									1.000

[a]Significant at .01 level of confidence for a two-tailed test.
[b]Significant at .05 level of confidence for a two-tailed test.
[c]Significant at .1 level of confidence for a two-tailed test.

APPENDIX H

APPENDIX H

INTERCORRELATION MATRIX OF COORDINATORS' LBDQ SUBTEST SCORES

	1	2	3	4	5	6	7	8	9	10	11	12
Representation	1.000	.188	.080	.612[b]	.596[c]	.664[b]	.721[a]	.728[a]	.602[c]	.431	.790[a]	.664[b]
Demand Reconciliation		1.000	.170	.601[c]	.616[b]	.118	.340	.526	.166	.711[b]	.341	.543
Tolerance of Uncertainty			1.000	.166	-.170	-.051	-.023	.128	-.260	.199	.385	.077
Persuasion				1.000	.684[b]	.558[c]	.434	.707[b]	.438	.838[a]	.645[b]	.841[a]
Initiating Structure					1.000	.427	.566[c]	.710[b]	.589[c]	.601[c]	.482	.723[b]
Tolerance of Freedom						1.000	.422	.583[c]	.284	.356	.497	.696[b]
Role Assumption							1.000	.615[c]	.497	.391	.727[b]	.422
Consideration								1.000	.386	.651[b]	.693[b]	.785[a]
Production Emphasis									1.000	.300	.462	.422
Predictive Accuracy										1.000	.576[c]	.726[b]
Integration											1.000	.593[c]
Superior Orientation												1.000

[a]Significant at .01 level of confidence with a two-tailed test.
[b]Significant at .05 level of confidence with a two-tailed test.
[c]Significant at .1 level of confidence with a two-tailed test.